

RIBONUCLEIC ACID-BASED MICROCAPSULES

Technical Field

The present invention relates to a new process for the preparation of ribonucleic acid-based microcapsules. Ribonucleic acid-based microcapsules are also an object of the invention. Perfuming compositions and consumer products comprising said microcapsules, in particular perfumed consumer products in the form of home care or personal care products, are also part of the invention.

Background of the Invention

One of the problems faced by the perfumery industry lies in the relatively rapid loss of olfactive benefit provided by odoriferous compounds due to their volatility, particularly that of “top-notes”. In order to tailor the release rates of volatiles, delivery systems such as microcapsules containing a perfume are needed to protect and later release the core payload when triggered. A key requirement from the industry regarding these systems is to survive suspension in challenging bases without physically dissociating or degrading. This is referred to as *stability* for the delivery system. For instance, fragranced personal and household cleansers containing high levels of aggressive surfactant detergents are very challenging for the stability of microcapsules.

Polyurea and polyurethane-based microcapsule slurry are widely used for example in perfumery industry for instance as they provide a long lasting pleasant olfactory effect after their applications on different substrates. Those microcapsules have been widely disclosed in the prior art.

In addition to the performance in terms of stability and olfactive performance, the consumer demand for eco-friendly delivery systems is more and more important and is driving the development of new delivery systems.

There is therefore still a need to provide new microcapsules using more eco-friendly materials, while not compromising on the performance of the microcapsules, in particular in terms of stability in a challenging medium such as a consumer product base, as well as in delivering a good performance in terms of active ingredient delivery, e.g. olfactive performance in the case of perfuming ingredients.

The present invention is proposing a solution to the above-mentioned problem by providing new ribonucleic acid-based microcapsules and a process for preparing said microcapsules.

5 **Summary of the invention**

In a first aspect, the present invention relates to a delivery system comprising a hydrophobic material and a carrier, wherein the carrier comprises ribonucleic acid (RNA).

10 In a second aspect, the present invention relates to a process for preparing a delivery system, comprising the following steps:

- Dispersing an oil phase comprising a hydrophobic material into a dispersing phase to obtain a two-phases dispersion,
- Performing a curing step to obtain a delivery system,

15 wherein ribonucleic acid is added in the oil phase and/or in the dispersing phase and/or in the two-phases dispersion.

The present invention also relates to perfumed consumer products and flavoured edible products comprising the microcapsules defined above.

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Detailed description of the invention

Unless stated otherwise, percentages (%) are meant to designate a percentage by weight of a composition.

25 By “**active ingredient**”, it is meant a single compound or a combination of ingredients.

By “**perfume or flavour oil**”, it is meant a single perfuming or flavouring compound or a mixture of several perfuming or flavouring compounds.

By “**consumer product**” or “**end-product**” it is meant a manufactured product ready to be distributed, sold and used by a consumer.

30 For the sake of clarity, by the expression “**dispersion**” in the present invention it is meant a system in which particles are dispersed in a continuous phase of a different composition and it specifically includes a suspension or an emulsion.

A “**microcapsule**”, or the similar, in the present invention it is meant that core-shell microcapsules have a particle size distribution in the micron range (e.g. a mean

diameter ($d(v, 0.5)$) comprised between about 1 and 3000 microns, preferably between 1 and 500 microns, more preferably between 10 and 500 microns). Nanocapsules (having typically a particle size less than 1 micron) are not part of the invention.

5 The microcapsule comprise an external solid polymeric shell and an internal continuous oil phase enclosed by the external shell. According to a particular embodiment, the polymeric shell is a polyamide-based shell.

 According to another particular embodiment, the polymeric shell is a coacervate comprising at least ribonucleic acid (RNA).

10 According to an embodiment, the slurry is an aqueous slurry, i.e the microcapsule(s) is (are) dispersed in an aqueous phase.

 By “**amino-compound**” it should be understood a compound having at least one reactive amine group.

 By “**polyamide-based microcapsules**”, it means that the microcapsule’s shell
15 comprises a polyamide material. The wording “polyamide-based microcapsules” can also encompass a shell made of a composite comprising a polyamide material and another material, for example ribonucleic acid (RNA) or a protein as defined in the present invention.

 “Polyamide-based microcapsules” and “polyamide microcapsules” are used
20 indifferently in the present invention.

 By “**polyfunctional monomer**”, it is meant a molecule that, as unit, reacts or binds chemically to form a polymer or a supramolecular polymer. The polyfunctional monomer of the invention has at least two functional groups that are capable to react with or bind to functional groups of another component and/or are capable to
25 polymerize to form a polymeric shell.

DELIVERY SYSTEM

 A first object of the invention is a delivery system comprising a hydrophobic material
30 and a carrier, wherein the carrier comprises ribonucleic acid (RNA).

Carrier

 By carrier or carrier material is herein understood that the material of the carrier is suitable to entrap, encapsulate or hold a certain amount of hydrophobic material.

Typically, when the delivery system is in a matrix form, the carrier material is a matrix material and the delivery system has to entrap preferably at least 20 wt.%, preferably at least 30 wt.%, even more preferably at least 35 wt.% of the hydrophobic material, based on the total weight of the delivery system.

5 Typically, when the delivery system is in the form a core-shell microcapsule, the carrier is a shell and the delivery system has to entrap preferably at least 80 wt.%, preferably at least 90 wt.%, of the hydrophobic material, based on the total weight of the delivery system.

10 In a particular embodiment, the carrier or carrier material is a solid carrier material, i.e. an emulsion or solvent is not a carrier or carrier material.

In a particular embodiment, the delivery system is a core-shell microcapsule or the delivery system is in a matrix form (i.e oil entrapped within a polymeric matrix, for example a monomeric, oligomeric or polymeric carrier matrix), preferably wherein the delivery system is a core-shell microcapsule.

15 For the sake of clarity, thereby it is understood that when the delivery system is a core-shell microcapsule, the hydrophobic material is comprised in the core which is surrounded or entrapped by the shell. When the delivery system is in the form of a matrix, the hydrophobic material is entrapped in a matrix of a carrier, such as a monomeric, oligomeric or polymeric carrier matrix, by adsorption in the matrix.

20 The carrier material is preferably present in an amount between 25 and 80 wt.%, preferably between 30 and 60 wt.% and more preferably between 40 and 55 wt. % (based on the total weight of the delivery system).

25 In case the delivery system is a core-shell microcapsule, it is herein understood that the perfume formulation is comprised in the core which is surrounded by a shell wall of the microcapsule.

The nature of the shell of the microcapsules of the invention can vary.

30 As non-limiting examples, the shell can comprise a material selected from the group consisting of polyurea, polyurethane, polyamide, polyester, polyhydroxyalkanoates, polyaminoesters, polyepoxides, polyacrylate, polysiloxane, polycarbonate, polysulfonamide, poly (beta aminoester), polylactic acid, poly (thiol-acrylate), polymers of urea and formaldehyde, melamine and formaldehyde, melamine and urea, or melamine and glyoxal, gelatin/ gum arabic shell wall and mixtures thereof.

According to a particular embodiment, the carrier and in particular the shell of the microcapsule is cured.

In a first particular embodiment of the core-shell microcapsules, the core-shell
5 microcapsule comprises a coacervate shell, preferably comprising ribonucleic acid (RNA) and an amino-compound.

According to an embodiment, the delivery system is a core-shell microcapsule comprising:

- 10 - a core comprising a hydrophobic material, preferably a perfume oil, and
- a polymeric shell comprising:
 - a polymeric material, and
 - a coacervate comprising a first polyelectrolyte and ribonucleic acid (RNA), wherein the first polyelectrolyte comprises a protein, preferably a
15 plant-protein.

According to this embodiment, the plant-protein can be chosen in the group consisting of soy protein, rice protein, canola protein, whey protein, potato protein, chickpea protein, pea protein, algae protein, faba bean protein, barley protein, oat protein, wheat gluten protein, lupin protein, and mixtures thereof.

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In a particular embodiment, the carrier (shell or a matrix material) comprises a biodegradable material.

In a particular embodiment, the carrier has a biodegradability of at least 40%, preferably at least 45%, 50%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95% or 98%,
25 within 60 days according to OECD301F.

In a particular embodiment, the delivery system has a biodegradability of at least 40 %, preferably at least 60 %, preferably at least 65%, 70%, 75%, 80%, 85%, 90%, 95% or 98% within 60 days according to OECD301F.

Thereby it is understood that the delivery system including all components, such
30 as the core, shell and optionally coating may have a biodegradability of at least 40 %, preferably at least 60 %, preferably at least 65%, 70%, 75%, 80%, 85%, 90%, 95% or 98% within 60 days according to OECD301F.

In a particular embodiment, the oil core, preferably perfume oil, has a biodegradability of at least 40 %, preferably at least 60 %, preferably at least 65%, 70%, 75%, 80%, 85%, 90%, 95% or 98% within 60 days according to OECD301F.

OECD301F is a standard test method on the biodegradability from the Organization
5 of Economic Co-operation and Development.

A typical method for extracting the shell for measuring the biodegradability is disclosed in *Gasparini and all in Molecules 2020, 25,718*.

RNA

10 According to the invention, the carrier of the delivery system comprises RNA (ribonucleic acid). RNA can be found commercially available.

RNA is preferably used in an amount comprised between 0.01 and 5%, preferably between 0.1 and 3% by weight, based on the total weight of the slurry or based on the total weight of the microcapsule.

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Hydrophobic material

According to an embodiment, the core is an oil-based core.

The hydrophobic material according to the invention can be “inert” material like solvents or active ingredients.

20 By “hydrophobic material”, it is meant any hydrophobic material which forms a two-phase dispersion when mixed with water. The hydrophobic material is typically liquid at about 20°C.

According to an embodiment, the hydrophobic material is a hydrophobic active ingredient.

25 When the hydrophobic materials is an active ingredient, it is preferably chosen from the group consisting of flavors, flavor ingredients, perfumes, perfume ingredients, nutraceuticals, cosmetics, pest control agents, agrochemical ingredients, biocide actives and mixtures thereof.

30 According to a particular embodiment, the hydrophobic material comprises a phase change material (PCM).

According to a particular embodiment, the hydrophobic material comprises a mixture of a perfume with another ingredient selected from the group consisting of nutraceuticals, cosmetics, pest control agents and biocide actives.

According to a particular embodiment, the hydrophobic material comprises a mixture of biocide actives with another ingredient selected from the group consisting of perfumes, nutraceuticals, cosmetics, pest control agents.

According to a particular embodiment, the hydrophobic material comprises a mixture of pest control agents with another ingredient selected from the group consisting of perfumes, nutraceuticals, cosmetics, biocide actives.

According to a particular embodiment, the hydrophobic material comprises a perfume.

According to a particular embodiment, the hydrophobic material consists of a perfume.

According to a particular embodiment, the hydrophobic material consists of biocide actives.

According to a particular embodiment, the hydrophobic material consists of pest control agents.

By "perfume" (or also "perfume oil") what is meant here is an ingredient or a composition that is a liquid at about 20°C. According to any one of the above embodiments said perfume oil can be a perfuming ingredient alone or a mixture of ingredients in the form of a perfuming composition. As a "perfuming ingredient" it is meant here a compound, which is used for the primary purpose of conferring or modulating an odor. In other words such an ingredient, to be considered as being a perfuming one, must be recognized by a person skilled in the art as being able to at least impart or modify in a positive or pleasant way the odor of a composition, and not just as having an odor. For the purpose of the present invention, perfume oil also includes a combination of perfuming ingredients with substances which together improve, enhance or modify the delivery of the perfuming ingredients, such as perfume precursors, modulators, emulsions or dispersions, as well as combinations which impart an additional benefit beyond that of modifying or imparting an odor, such as long-lastingness, blooming, malodor counteraction, antimicrobial effect, microbial stability, pest control.

The nature and type of the perfuming ingredients present in the oil phase do not warrant a more detailed description here, which in any case would not be exhaustive, the skilled person being able to select them on the basis of its general knowledge and according to intended use or application and the desired organoleptic effect. In general terms, these perfuming ingredients belong to chemical classes as

varied as alcohols, aldehydes, ketones, esters, ethers, acetates, nitriles, terpenoids, nitrogenous or sulfurous heterocyclic compounds and essential oils (for example Thyme oil), and said perfuming co-ingredients can be of natural or synthetic origin. Many of these co-ingredients are in any case listed in reference texts such as the book

5 by S. Arctander, Perfume and Flavor Chemicals, 1969, Montclair, New Jersey, USA, or its more recent versions, or in other works of a similar nature, as well as in the abundant patent literature in the field of perfumery.

In particular one may cite perfuming ingredients which are commonly used in perfume formulations, such as:

- 10 – Aldehydic ingredients: decanal, dodecanal, 2-methyl-undecanal, 10-undecenal, octanal, nonanal and/or nonenal;
- Aromatic-herbal ingredients: eucalyptus oil, camphor, eucalyptol, 5-methyltricyclo[6.2.1.0^{2,7}]undecan-4-one, 1-methoxy-3-hexanethiol, 2-ethyl-4,4-dimethyl-1,3-oxathiane, 2,2,7/8,9/10-tetramethylspiro[5.5]undec-8-en-1-one,
- 15 menthol and/or alpha-pinene;
- Balsamic ingredients: coumarin, ethylvanillin and/or vanillin;
- Citrus ingredients: dihydromyrcenol, citral, orange oil, linalyl acetate, citronellyl nitrile, orange terpenes, limonene, 1-p-menthen-8-yl acetate and/or 1,4(8)-p-menthadiene;
- 20 – Floral ingredients: methyl dihydrojasmonate, linalool, citronellol, phenylethanol, 3-(4-tert-butylphenyl)-2-methylpropanal, hexylcinnamic aldehyde, benzyl acetate, benzyl salicylate, tetrahydro-2-isobutyl-4-methyl-4(2H)-pyranol, beta ionone, methyl 2-(methylamino)benzoate, (E)-3-methyl-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-3-buten-2-one, (1E)-1-(2,6,6-trimethyl-2-cyclohexen-1-yl)-1-
- 25 penten-3-one, 1-(2,6,6-trimethyl-1,3-cyclohexadien-1-yl)-2-buten-1-one, (2E)-1-(2,6,6-trimethyl-2-cyclohexen-1-yl)-2-buten-1-one, (2E)-1-[2,6,6-trimethyl-3-cyclohexen-1-yl]-2-buten-1-one, (2E)-1-(2,6,6-trimethyl-1-cyclohexen-1-yl)-2-buten-1-one, 3-(3,3/1,1-dimethyl-5-indanyl)propanal, 2,5-dimethyl-2-indanmethanol, 2,6,6-trimethyl-3-cyclohexene-1-carboxylate, 3-(4,4-dimethyl-
- 30 1-cyclohexen-1-yl)propanal, hexyl salicylate, 3,7-dimethyl-1,6-nonadien-3-ol, 3-(4-isopropylphenyl)-2-methylpropanal, verdyol acetate, geraniol, p-menth-1-en-8-ol, 4-(1,1-dimethylethyl)-1-cyclohexyle acetate, 1,1-dimethyl-2-phenylethyl acetate, 4-cyclohexyl-2-methyl-2-butanol, amyl salicylate, high cis

- 5 methyl dihydrojasmonate, 3-methyl-5-phenyl-1-pentanol, verdyl proprionate, geranyl acetate, tetrahydro linalool, cis-7-p-menthanol, propyl (S)-2-(1,1-dimethylpropoxy)propanoate, 2-methoxynaphthalene, 2,2,2-trichloro-1-phenylethyl acetate, 4/3-(4-hydroxy-4-methylpentyl)-3-cyclohexene-1-carbaldehyde, amylcinnamic aldehyde, 8-decen-5-olide, 4-phenyl-2-butanone, isononyl acetate, 4-(1,1-dimethylethyl)-1-cyclohexyl acetate, verdyl isobutyrate and/or mixture of methylionones isomers;
- 10 – Fruity ingredients: gamma-undecalactone, 2,2,5-trimethyl-5-pentylcyclopentanone, 2-methyl-4-propyl-1,3-oxathiane, 4-decanolide, ethyl 2-methyl-pentanoate, hexyl acetate, ethyl 2-methylbutanoate, gamma-nonolactone, allyl heptanoate, 2-phenoxyethyl isobutyrate, ethyl 2-methyl-1,3-dioxolane-2-acetate, diethyl 1,4-cyclohexanedicarboxylate, 3-methyl-2-hexen-1-yl acetate, 1-[3,3-dimethylcyclohexyl]ethyl [3-ethyl-2-oxiranyl]acetate and/or diethyl 1,4-cyclohexane dicarboxylate;
- 15 – Green ingredients: 2-methyl-3-hexanone (E)-oxime, 2,4-dimethyl-3-cyclohexene-1-carbaldehyde, 2-tert-butyl-1-cyclohexyl acetate, styrallyl acetate, allyl (2-methylbutoxy)acetate, 4-methyl-3-decen-5-ol, diphenyl ether, (Z)-3-hexen-1-ol and/or 1-(5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one;
- 20 – Musk ingredients: 1,4-dioxo-5,17-cycloheptadecanedione, (Z)-4-cyclopentadecen-1-one, 3-methylcyclopentadecanone, 1-oxa-12-cyclohexadecen-2-one, 1-oxa-13-cyclohexadecen-2-one, (9Z)-9-cycloheptadecen-1-one, 2-[(1S)-1-[(1R)-3,3-dimethylcyclohexyl]ethoxy]-2-oxoethyl propionate, 3-methyl-5-cyclopentadecen-1-one, 4,6,6,7,8,8-hexamethyl-1,3,4,6,7,8-hexahydrocyclopenta[g]isochromene, (1S,1'R)-2-[1-(3',3'-dimethyl-1'-cyclohexyl)ethoxy]-2-methylpropyl propanoate, oxacyclohexadecan-2-one and/or (1S,1'R)-[1-(3',3'-dimethyl-1'-cyclohexyl)ethoxycarbonyl]methyl propanoate;
- 25 – Woody ingredients: 1-[(1RS,6SR)-2,2,6-trimethylcyclohexyl]-3-hexanol, 3,3-dimethyl-5-[(1R)-2,2,3-trimethyl-3-cyclopenten-1-yl]-4-penten-2-ol, 3,4'-dimethylspiro[oxirane-2,9'-tricyclo[6.2.1.0^{2,7}]undec[4]ene, (1-ethoxyethoxy)cyclododecane, 2,2,9,11-tetramethylspiro[5.5]undec-8-en-1-yl acetate, 1-(octahydro-2,3,8,8-tetramethyl-2-naphthalenyl)-1-ethanone, patchouli oil, terpenes fractions of patchouli oil, Clearwood®, (1'R,E)-2-ethyl-4-(2',2',3'-
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trimethyl-3'-cyclopenten-1'-yl)-2-buten-1-ol, 2-ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-buten-1-ol, methyl cedryl ketone, 5-(2,2,3-trimethyl-3-cyclopentenyl)-3-methylpentan-2-ol, 1-(2,3,8,8-tetramethyl-1,2,3,4,6,7,8,8a-octahydronaphthalen-2-yl)ethan-1-one and/or isobornyl acetate;

- 5 – Other ingredients (e.g. amber, powdery spicy or watery): dodecahydro-3a,6,6,9a-tetramethyl-naphtho[2,1-b]furan and any of its stereoisomers, heliotropin, anisic aldehyde, eugenol, cinnamic aldehyde, clove oil, 3-(1,3-benzodioxol-5-yl)-2-methylpropanal, 7-methyl-2H-1,5-benzodioxepin-3(4H)-one, 2,5,5-trimethyl-1,2,3,4,4a,5,6,7-octahydro-2-naphthalenol, 1-phenylvinyl
10 acetate, 6-methyl-7-oxa-1-thia-4-azaspiro[4.4]nonane and/or 3-(3-isopropyl-1-phenyl)butanal.

It is also understood that said ingredients may also be compounds known to release in a controlled manner various types of perfuming compounds also known as properfume or profragrance. Non-limiting examples of suitable properfumes may
15 include 4-(dodecylthio)-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-2-butanone, 4-(dodecylthio)-4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-2-butanone, 3-(dodecylthio)-1-(2,6,6-trimethyl-3-cyclohexen-1-yl)-1-butanone, 2-(dodecylthio)octan-4-one, 2-phenylethyl oxo(phenyl)acetate, 3,7-dimethylocta-2,6-dien-1-yl oxo(phenyl)acetate, (Z)-hex-3-en-1-yl oxo(phenyl)acetate, 3,7-dimethyl-2,6-octadien-1-yl hexadecanoate,
20 bis(3,7-dimethylocta-2,6-dien-1-yl) succinate, (2-((2-methylundec-1-en-1-yl)oxy)ethyl)benzene, 1-methoxy-4-(3-methyl-4-phenethoxybut-3-en-1-yl)benzene, (3-methyl-4-phenethoxybut-3-en-1-yl)benzene, 1-(((Z)-hex-3-en-1-yl)oxy)-2-methylundec-1-ene, (2-((2-methylundec-1-en-1-yl)oxy)ethoxy)benzene, 2-methyl-1-(octan-3-yloxy)undec-1-ene, 1-methoxy-4-(1-phenethoxyprop-1-en-2-yl)benzene, 1-
25 methyl-4-(1-phenethoxyprop-1-en-2-yl)benzene, 2-(1-phenethoxyprop-1-en-2-yl)naphthalene, (2-phenethoxyvinyl)benzene, 2-(1-((3,7-dimethyloct-6-en-1-yl)oxy)prop-1-en-2-yl)naphthalene, (2-((2-pentylcyclopentylidene)methoxy)ethyl)benzene, 4-allyl-2-methoxy-1-((2-methoxy-2-phenylvinyl)oxy)benzene, (2-((2-heptylcyclopentylidene)methoxy)ethyl)benzene, 1-
30 isopropyl-4-methyl-2-((2-pentylcyclopentylidene)methoxy)benzene, 2-methoxy-1-((2-pentylcyclopentylidene)methoxy)-4-propylbenzene, 3-methoxy-4-((2-methoxy-2-phenylvinyl)oxy)benzaldehyde, 4-((2-(hexyloxy)-2-phenylvinyl)oxy)-3-methoxybenzaldehyde or a mixture thereof.

The perfuming ingredients may be dissolved in a solvent of current use in the perfume industry. The solvent is preferably not an alcohol. Examples of such solvents are diethyl phthalate, isopropyl myristate, Abalyn® (rosin resins, available from Eastman), benzyl benzoate, ethyl citrate, triethyl citrate, limonene or other terpenes, or isoparaffins. Preferably, the solvent is very hydrophobic and highly sterically hindered, like for example Abalyn® or benzyl benzoate. Preferably the perfume comprises less than 30% of solvent. More preferably the perfume comprises less than 20% and even more preferably less than 10% of solvent, all these percentages being defined by weight relative to the total weight of the perfume. Most preferably, the perfume is essentially free of solvent.

Preferred perfuming ingredients are those having a high steric hindrance and in particular those from one of the following groups:

- Group 1: perfuming ingredients comprising a cyclohexane, cyclohexene, cyclohexanone or cyclohexenone ring substituted with at least one linear or branched C₁ to C₄ alkyl or alkenyl substituent;
- Group 2: perfuming ingredients comprising a cyclopentane, cyclopentene, cyclopentanone or cyclopentenone ring substituted with at least one linear or branched C₄ to C₈ alkyl or alkenyl substituent;
- Group 3: perfuming ingredients comprising a phenyl ring or perfuming ingredients comprising a cyclohexane, cyclohexene, cyclohexanone or cyclohexenone ring substituted with at least one linear or branched C₅ to C₈ alkyl or alkenyl substituent or with at least one phenyl substituent and optionally one or more linear or branched C₁ to C₃ alkyl or alkenyl substituents;
- Group 4: perfuming ingredients comprising at least two fused or linked C₅ and/or C₆ rings;
- Group 5: perfuming ingredients comprising a camphor-like ring structure;
- Group 6: perfuming ingredients comprising at least one C₇ to C₂₀ ring structure;
- Group 7: perfuming ingredients having a logP value above 3.5 and comprising at least one tert-butyl or at least one trichloromethyl substituent;

Examples of ingredients from each of these groups are:

- Group 1: 2,4-dimethyl-3-cyclohexene-1-carbaldehyde (origin: Firmenich SA, Geneva, Switzerland), isocyclocitral, menthone, isomenthone, methyl 2,2-dimethyl-6-methylene-1-cyclohexanecarboxylate (origin: Firmenich SA, Geneva, Switzerland), nerone, terpineol, dihydroterpineol, terpenyl acetate,

- dihydroterpenyl acetate, dipentene, eucalyptol, hexylate, rose oxide, (S)-1,8-p-menthadiene-7-ol (origin: Firmenich SA, Geneva, Switzerland), 1-p-menthene-4-ol, (1RS,3RS,4SR)-3-p-mentanyl acetate, (1R,2S,4R)-4,6,6-trimethyl-bicyclo[3,1,1]heptan-2-ol, tetrahydro-4-methyl-2-phenyl-2H-pyran (origin: Firmenich SA, Geneva, Switzerland), cyclohexyl acetate, cyclanol acetate, 1,4-cyclohexane diethyldicarboxylate (origin: Firmenich SA, Geneva, Switzerland), (3RS,3aRS,6SR,7ASR)-perhydro-3,6-dimethyl-benzo[B]furan-2-one (origin: Firmenich SA, Geneva, Switzerland), ((6R)-perhydro-3,6-dimethyl-benzo[B]furan-2-one (origin: Firmenich SA, Geneva, Switzerland), 2,4,6-trimethyl-4-phenyl-1,3-dioxane, 2,4,6-trimethyl-3-cyclohexene-1-carbaldehyde;
- Group 2: (E)-3-methyl-5-(2,2,3-trimethyl-3-cyclopenten-1-yl)-4-penten-2-ol (origin: Givaudan SA, Vernier, Switzerland), (1'R,E)-2-ethyl-4-(2',2',3'-trimethyl-3'-cyclopenten-1'-yl)-2-buten-1-ol (origin: Firmenich SA, Geneva, Switzerland), (1'R,E)-3,3-dimethyl-5-(2',2',3'-trimethyl-3'-cyclopenten-1'-yl)-4-penten-2-ol (origin: Firmenich SA, Geneva, Switzerland), 2-heptylcyclopentanone, methyl-cis-3-oxo-2-pentyl-1-cyclopentane acetate (origin: Firmenich SA, Geneva, Switzerland), 2,2,5-trimethyl-5-pentyl-1-cyclopentanone (origin: Firmenich SA, Geneva, Switzerland), 3,3-dimethyl-5-(2,2,3-trimethyl-3-cyclopenten-1-yl)-4-penten-2-ol (origin: Firmenich SA, Geneva, Switzerland), 3-methyl-5-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-pentanol (origin: Givaudan SA, Vernier, Switzerland);
 - Group 3: damascones, 1-(5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one (origin: Firmenich SA, Geneva, Switzerland), (1'R)-2-[2-(4'-methyl-3'-cyclohexen-1'-yl)propyl]cyclopentanone, alpha-ionone, beta-ionone, damascenone, mixture of 1-(5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one and 1-(3,3-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one (origin: Firmenich SA, Geneva, Switzerland), 1-(2,6,6-trimethyl-1-cyclohexen-1-yl)-2-buten-1-one (origin: Firmenich SA, Geneva, Switzerland), (1S,1'R)-[1-(3',3'-Dimethyl-1'-cyclohexyl)ethoxycarbonyl]methyl propanoate (origin: Firmenich SA, Geneva, Switzerland), 2-tert-butyl-1-cyclohexyl acetate (origin: International Flavors and Fragrances, USA), 1-(2,2,3,6-tetramethyl-cyclohexyl)-3-hexanol (origin: Firmenich SA, Geneva, Switzerland), trans-1-(2,2,6-trimethyl-1-cyclohexyl)-3-hexanol (origin: Firmenich SA, Geneva, Switzerland), (E)-3-methyl-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-3-buten-2-one, terpenyl isobutyrate, 4-(1,1-dimethylethyl)-1-cyclohexyl acetate (origin: Firmenich

- SA, Geneva, Switzerland), 8-methoxy-1-p-menthene, (1S,1'R)-2-[1-(3',3'-dimethyl-1'-cyclohexyl) ethoxy]-2-methylpropyl propanoate (origin: Firmenich SA, Geneva, Switzerland), para tert-butylcyclohexanone, menthenethiol, 1-methyl-4-(4-methyl-3-pentenyl)-3-cyclohexene-1-carbaldehyde, allyl cyclohexylpropionate, cyclohexyl salicylate, 2-methoxy-4-methylphenyl methyl carbonate, ethyl 2-methoxy-4-methylphenyl carbonate, 4-ethyl-2-methoxyphenyl methyl carbonate;
- Group 4: Methyl cedryl ketone (origin: International Flavors and Fragrances, USA), a mixture of (1RS,2SR,6RS,7RS,8SR)-tricyclo[5.2.1.0^{2,6}]dec-3-en-8-yl 2-methylpropanoate and (1RS,2SR,6RS,7RS,8SR)-tricyclo[5.2.1.0^{2,6}]dec-4-en-8-yl 2-methylpropanoate, vetyverol, vetyverone, 1-(octahydro-2,3,8,8-tetramethyl-2-naphthalenyl)-1-ethanone (origin: International Flavors and Fragrances, USA), (5RS,9RS,10SR)-2,6,9,10-tetramethyl-1-oxaspiro[4.5]deca-3,6-diene and the (5RS,9SR,10RS) isomer, 6-ethyl-2,10,10-trimethyl-1-oxaspiro[4.5]deca-3,6-diene, 1,2,3,5,6,7-hexahydro-1,1,2,3,3-pentamethyl-4-indenone (origin: International Flavors and Fragrances, USA), a mixture of 3-(3,3-dimethyl-5-indanyl)propanal and 3-(1,1-dimethyl-5-indanyl)propanal (origin: Firmenich SA, Geneva, Switzerland), 3',4-dimethyl-tricyclo[6.2.1.0(2,7)]undec-4-ene-9-spiro-2'-oxirane (origin: Firmenich SA, Geneva, Switzerland), 9/10-ethylidene-3-oxatricyclo[6.2.1.0(2,7)]undecane, (perhydro-5,5,8A-trimethyl-2-naphthalenyl acetate (origin: Firmenich SA, Geneva, Switzerland), octalynol, (dodecahydro-3a,6,6,9a-tetramethyl-naphtho[2,1-b]furan, origin: Firmenich SA, Geneva, Switzerland), tricyclo[5.2.1.0(2,6)]dec-3-en-8-yl acetate and tricyclo[5.2.1.0(2,6)]dec-4-en-8-yl acetate as well as tricyclo[5.2.1.0(2,6)]dec-3-en-8-yl propanoate and tricyclo[5.2.1.0(2,6)]dec-4-en-8-yl propanoate, (+)-(1S,2S,3S)-2,6,6-trimethyl-bicyclo[3.1.1]heptane-3-spiro-2'-cyclohexen-4'-one;
- Group 5: camphor, borneol, isobornyl acetate, 8-isopropyl-6-methyl-bicyclo[2.2.2]oct-5-ene-2-carbaldehyde, pinene, camphene, 8-methoxycedrane, (8-methoxy-2,6,6,8-tetramethyl-tricyclo[5.3.1.0(1,5)]undecane (origin: Firmenich SA, Geneva, Switzerland), cedrene, cedrenol, cedrol, mixture of 9-ethylidene-3-oxatricyclo[6.2.1.0(2,7)]undecan-4-one and 10-ethylidene-3-oxatricyclo[6.2.1.0^{2,7}]undecan-4-one (origin: Firmenich SA, Geneva, Switzerland), 3-methoxy-7,7-dimethyl-10-methylene-bicyclo[4.3.1]decane (origin: Firmenich SA, Geneva, Switzerland);

- Group 6: (trimethyl-13-oxabicyclo-[10.1.0]-trideca-4,8-diene (origin: Firmenich SA, Geneva, Switzerland), 9-hexadecen-16-olide (origin: Firmenich SA, Geneva, Switzerland), pentadecenolide (origin: Firmenich SA, Geneva, Switzerland), 3-methyl-(4/5)-cyclopentadecenone (origin: Firmenich SA, Geneva, Switzerland), 3-methylcyclopentadecanone (origin: Firmenich SA, Geneva, Switzerland), pentadecanolide (origin: Firmenich SA, Geneva, Switzerland), cyclopentadecanone (origin: Firmenich SA, Geneva, Switzerland), 1-ethoxyethoxycyclododecane (origin: Firmenich SA, Geneva, Switzerland), 1,4-dioxacycloheptadecane-5,17-dione, 4,8-cyclododecadien-1-one;
- 10 - Group 7: (+-)-2-methyl-3-[4-(2-methyl-2-propanyl)phenyl]propanal (origin: Givaudan SA, Vernier, Switzerland), 2,2,2-trichloro-1-phenylethyl acetate.

Preferably, the perfume comprises at least 30%, preferably at least 50%, more preferably at least 60% of ingredients selected from Groups 1 to 7, as defined above. More preferably said perfume comprises at least 30%, preferably at least 50% of ingredients from Groups 3 to 7, as defined above. Most preferably said perfume comprises at least 30%, preferably at least 50% of ingredients from Groups 3, 4, 6 or 7, as defined above.

According to another preferred embodiment, the perfume comprises at least 30%, preferably at least 50%, more preferably at least 60% of ingredients having a logP above 3, preferably above 3.5 and even more preferably above 3.75.

According to a particular embodiment, the perfume used in the invention contains less than 10% of its own weight of primary alcohols, less than 15% of its own weight of secondary alcohols and less than 20% of its own weight of tertiary alcohols. Advantageously, the perfume used in the invention does not contain any primary alcohols and contains less than 15% of secondary and tertiary alcohols.

According to an embodiment, the oil phase (or the oil-based core) comprises:

- 25-100wt% of a perfume oil comprising at least 15wt% of high impact perfume raw materials having a Log T<-4, and
- 0-75wt% of a density balancing material having a density greater than 1.07 g/cm³.

"High impact perfume raw materials" should be understood as perfume raw materials having a LogT<-4. The odor threshold concentration of a chemical compound is determined in part by its shape, polarity, partial charges and molecular mass. For

convenience, the odor threshold concentration is presented as the common logarithm of the threshold concentration, i.e., Log [Threshold] ("LogT").

A "*density balancing material*" should be understood as a material having a density greater than 1.07 g/cm³ and having preferably low or no odor.

5 The odor threshold concentration of a perfuming compound is determined by using a gas chromatograph ("GC"). Specifically, the gas chromatograph is calibrated to determine the exact volume of the perfume oil ingredient injected by the syringe, the precise split ratio, and the hydrocarbon response using a hydrocarbon standard of known concentration and chain-length distribution. The air flow rate is accurately
10 measured and, assuming the duration of a human inhalation to last 12 seconds, the sampled volume is calculated. Since the precise concentration at the detector at any point in time is known, the mass per volume inhaled is known and hence the concentration of the perfuming compound. To determine the threshold concentration, solutions are delivered to the sniff port at the back-calculated concentration. A panelist
15 sniffs the GC effluent and identifies the retention time when odor is noticed. The average across all panelists determines the odor threshold concentration of the perfuming compound. The determination of odor threshold is described in more detail in C. Vuilleumier et al., Multidimensional Visualization of Physical and Perceptual Data Leading to a Creative Approach in Fragrance Development, Perfume & Flavorist, Vol.
20 33, September,, 2008, pages 54-61.

The nature of high impact perfume raw materials having a Log T<-4 and density balancing material having a density greater than 1.07 g/cm³ are described in WO2018115250, the content of which are included by reference.

According to an embodiment, the high impact perfume raw materials having a
25 Log T<-4 are selected from the group consisting of (+-)-1-methoxy-3-hexanethiol, 4-(4-hydroxy-1-phenyl)-2-butanone, 2-methoxy-4-(1-propenyl)-1-phenyl acetate, pyrazobutyle, 3-propylphenol, 1-(3-methyl-1-benzofuran-2-yl)ethanone, 2-(3-phenylpropyl)pyridine, 1-(3,3/5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one , 1-(5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one, a mixture comprising
30 (3RS,3aRS,6SR,7ASR)-perhydro-3,6-dimethyl-benzo[b]furan-2-one and (3SR,3aRS,6SR,7ASR)-perhydro-3,6-dimethyl-benzo[b]furan-2-one, (+-)-1-(5-ethyl-5-methyl-1-cyclohexen-1-yl)-4-penten-1-one, (1'S,3'R)-1-methyl-2-[(1',2',2'-trimethylbicyclo[3.1.0]hex-3'-yl)methyl]cyclopropylmethanol, (+-)-3-mercaptohexyl acetate, (2E)-1-(2,6,6-trimethyl-1,3-cyclohexadien-1-yl)-2-buten-1-one, H-methyl-2h-

1,5-benzodioxepin-3(4H)-one, (2E,6Z)-2,6-nonadien-1-ol, (4Z)-4-dodecenal, (+-)-4-hydroxy-2,5-dimethyl-3(2H)-furanone, methyl 2,4-dihydroxy-3,6-dimethylbenzoate, 3-methylindole, (+-)-perhydro-4 α ,8 β -dimethyl-4a-naphthalenol, patchoulol, 2-methoxy-4-(1-propenyl)phenol, mixture comprising (+-)-5,6-dihydro-4-methyl-2-phenyl-2H-pyran and tetrahydro-4-methylene-2-phenyl-2H-pyran, mixture comprising 4-methylene-2-phenyltetrahydro-2H-pyran and (+-)-4-methyl-2-phenyl-3,6-dihydro-2H-pyran, 4-hydroxy-3-methoxybenzaldehyde, nonylenic aldehyde, 2-methoxy-4-propylphenol, 3-methyl-5-phenyl-2-pentenitrile, 1-(spiro[4.5]dec-6/7-en-7-yl)-4-penten-1-one, 2-methoxynaphthalene, (-)-(3aR,5aS,9AS,9BR)-3a,6,6,9a-tetramethyldodecahydronaphtho[2,1-b]furan, 5-nonanolide, (3aR,5AS,9AS,9BR)-3a,6,6,9a-tetramethyldodecahydronaphtho[2,1-b]furan, 7-isopropyl-2H,4H-1,5-benzodioxepin-3-one, coumarin, 4-methylphenyl isobutyrate, (2E)-1-(2,6,6-trimethyl-1,3-cyclohexadien-1-yl)-2-buten-1-one, β ,2,2,3-tetramethyl- δ -methylene-3-cyclopentene-1-butanol, δ -damascone ((2E)-1-[(1R,2SR)-2,6,6-trimethyl-3-cyclohexen-1-yl]-2-buten-1-one), (+-)-3,6-dihydro-4,6-dimethyl-2-phenyl-2H-pyran, anisaldehyde, paracresol, 3-ethoxy-4-hydroxybenzaldehyde, methyl 2-aminobenzoate, ethyl methylphenylglycidate, octalactone γ , ethyl 3-phenyl-2-propenoate, (-)-(2E)-2-ethyl-4-[(1R)-2,2,3-trimethyl-3-cyclopenten-1-yl]-2-buten-1-ol, paracresyl acetate, dodecalactone, tricyclone, (+)-(3R,5Z)-3-methyl-5-cyclopentadecen-1-one, undecalactone, (1R,4R)-8-mercapto-3-p-menthanone, (3S,3AS,6R,7AR)-3,6-dimethylhexahydro-1-benzofuran-2(3H)-one, β -ionone, (+)-6-pentyltetrahydro-2H-pyran-2-one, (3E,5Z)-1,3,5-undecatriene, 10-undecenal, (9E)-9-undecenal (9Z)-9-undecenal, (Z)-4-decenal, (+)-ethyl 2-methylpentanoate, 1,2-diallyldisulfane, 2-tridecenitrile, 3-tridecenitrile, , (+)-2-ethyl-4,4-dimethyl-1,3-oxathiane, (+)-(3R,5Z)-3-methyl-5-cyclopentadecen-1-one, 3-(4-tert-butylphenyl)propanal, allyl (cyclohexyloxy)acetate, methyl naphthylketone, (+)-(4E)-3-methyl-4-cyclopentadecen-1-one, (+)-5E3-methyl-5-cyclopentadecen-1-one, cyclopropylmethyl 3-hexenoate, (4E)-4-methyl-5-(4-methylphenyl)-4-pentenal, (+)-1-(5-propyl-1,3-benzodioxol-2-yl)ethanone, 4-methyl-2-pentylpyridine, (+)-(E)-3-methyl-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-3-buten-2-one, (3aRS,5aSR,9aSR,9bRS)-3a,6,6,9a-tetramethyldodecahydronaphtho[2,1-b]furan, (2S,5R)-5-methyl-2-(2-propenyl)cyclohexanone oxime, 6-hexyltetrahydro-2H-pyran-2-one, (+)-3-(3-isopropyl-1-phenyl)butanal, methyl 2-(3-oxo-2-pentylcyclopentyl)acetate, 1-(2,6,6-trimethyl-1-cyclohex-2-enyl)pent-1-en-3-one,

indol, 7-propyl-2H,4H-1,5-benzodioxepin-3-one, ethyl praline, (4-methylphenoxy)acetaldehyde, ethyl tricyclo[5.2.1.0.^{2,6}]decane-2-carboxylate, (+)-(1'S,2S,E)-3,3-dimethyl-5-(2',2',3'-trimethyl-3'-cyclopenten-1'-yl)-4-penten-2-ol, (4E)-3,3-dimethyl-5-[(1R)-2,2,3-trimethyl-3-cyclopenten-1-yl]-4-penten-2-ol, 8-isopropyl-6-methyl-bicyclo[2.2.2]oct-5-ene-2-carbaldehyde, methylnonylacetaldehyde, 4-formyl-2-methoxyphenyl 2-methylpropanoate, (E)-4-decenal, (+)-2-ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-buten-1-ol, (1R,5R)-4,7,7-trimethyl-6-thiabicyclo[3.2.1]oct-3-ene, (1R,4R,5R)-4,7,7-trimethyl-6-thiabicyclo[3.2.1]octane, (-)-(3R)-3,7-dimethyl-1,6-octadien-3-ol, (E)-3-phenyl-2-propenenitrile, 4-methoxybenzyl acetate, (E)-3-methyl-5-(2,2,3-trimethyl-3-cyclopenten-1-yl)-4-penten-2-ol, allyl (2/3-methylbutoxy)acetate, (+)-(2E)-1-(2,6,6-trimethyl-2-cyclohexen-1-yl)-2-buten-1-one, (1E)-1-(2,6,6-trimethyl-1-cyclohexen-1-yl)-1-penten-3-one, and mixtures thereof.

According to an embodiment, perfume raw materials having a Log T<-4 are chosen in the group consisting of aldehydes, ketones, alcohols, phenols, esters lactones, ethers, epoxydes, nitriles and mixtures thereof.

According to an embodiment, perfume raw materials having a Log T<-4 comprise at least one compound chosen in the group consisting of alcohols, phenols, esters lactones, ethers, epoxydes, nitriles and mixtures thereof, preferably in amount comprised between 20 and 70% by weight based on the total weight of the perfume raw materials having a Log T<-4.

According to an embodiment, perfume raw materials having a Log T<-4 comprise between 20 and 70% by weight of aldehydes, ketones, and mixtures thereof based on the total weight of the perfume raw materials having a Log T<-4.

The remaining perfume raw materials contained in the oil-based core may have therefore a Log T>-4.

According to an embodiment, the perfume raw materials having a Log T>-4 are chosen in the group consisting of ethyl 2-methylbutyrate, (E)-3-phenyl-2-propenyl acetate, (+)-6/8-sec-butylquinoline, (+)-3-(1,3-benzodioxol-5-yl)-2-methylpropanal, verdyl propionate, 1-(octahydro-2,3,8,8-tetramethyl-2-naphthalenyl)-1-ethanone, methyl 2-((1RS,2RS)-3-oxo-2-pentylcyclopentyl)acetate, (+)-(E)-4-methyl-3-decen-5-ol, 2,4-dimethyl-3-cyclohexene-1-carbaldehyde, 1,3,3-trimethyl-2-oxabicyclo[2.2.2]octane, tetrahydro-4-methyl-2-(2-methyl-1-propenyl)-2H-pyran, dodecanal, 1-oxa-12/13-cyclohexadecen-2-one, (+)-3-(4-isopropylphenyl)-2-methylpropanal, aldehyde C11, (+)-2,6-dimethyl-7-octen-2-ol, allyl 3-

cyclohexylpropanoate, (Z)-3-hexenyl acetate, 5-methyl-2-(2-propanyl)cyclohexanone, allyl heptanoate, 2-(2-methyl-2-propanyl)cyclohexyl acetate, 1,1-dimethyl-2-phenylethyl butyrate, geranyl acetate, neryl acetate, (+)-1-phenylethyl acetate, 1,1-dimethyl-2-phenylethyl acetate, 3-methyl-2-butenyl acetate, ethyl 3-oxobutanoate, (2Z)-ethyl 3-hydroxy-2-butenate, 8-p-menthanol, 8-p-menthanyl acetate, 1-p-menthanyl acetate, (+)-2-(4-methyl-3-cyclohexen-1-yl)-2-propanyl acetate, (+)-2-methylbutyl butanoate, 2-[(1S)-1-[(1R)-3,3-dimethylcyclohexyl]ethoxy]-2-oxoethyl propionate, 3,5,6-trimethyl-3-cyclohexene-1-carbaldehyde, 2,4,6-trimethyl-3-cyclohexene-1-carbaldehyde, 2-cyclohexylethyl acetate, octanal, ethyl butanoate, (+)-10-(3E)-4-(2,6,6-trimethyl-1/2-cyclohexen-1-yl)-3-buten-2-one, 1-[(1R,6SR)-2,2,6-trimethylcyclohexyl]-3-hexanol, 1,3,3-trimethyl-2-oxabicyclo[2.2.2]octane, 1,3,3-trimethyl-2-oxabicyclo[2.2.2]octane, ethyl hexanoate, undecanal, decanal, 2-phenylethyl acetate, (1S,2S,4S)-1,7,7-trimethylbicyclo[2.2.1]heptan-2-ol, (1S,2R,4S)-1,7,7-trimethylbicyclo[2.2.1]heptan-2-ol, (+)-3,7-dimethyl-3-octanol, 1-methyl-4-(2-15-propanylidene)cyclohexene, (+)-(R)-4-(2-methoxypropan-2-yl)-1-methylcyclohex-1-ene, verdyl acetate, (3R)-1-[(1R,6S)-2,2,6-trimethylcyclohexyl]-3-hexanol, (3S)-1-[(1R,6S)-2,2,6-trimethylcyclohexyl]-3-hexanol, (3R)-1-[(1S,6S)-2,2,6-trimethylcyclohexyl]-3-hexanol, (+)-(1S,1'R)-2-[1-(3',3'-dimethyl-1'-cyclohexyl)ethoxy]-2-methylpropyl propanoate, and mixtures thereof.

20 According to an embodiment, the core comprises a perfume formulation comprising:

- 0 to 60 wt.% of a hydrophobic solvent (based on the total weight of the perfume formulation),
- 40 to 100 wt.% of a perfume oil (based on the total weight of the perfume formulation), wherein the perfume oil has at least two, preferably all of the following characteristics:

- o at least 35%, preferably at least 40%, preferably at least 50%, more preferably at least 60% of perfuming ingredients having a log P above 3, preferably above 3.5,
- o at least 20%, preferably at least 25%, preferably at least 30%, more preferably at least 40% of Bulky materials of groups 1 to 6, preferably 3 to 6 as herein defined and

- o at least 15%, preferably at least 20%, more preferably at least 25%, even more preferably at least 30% of high impact perfume materials having a Log T < -4,

optionally, further hydrophobic active ingredients.

- 5 According to a particular embodiment, the perfume comprises 0 to 60 wt.% of a hydrophobic solvent.

According to a particular embodiment, the hydrophobic solvent is a density balancing material preferably chosen in the group consisting of benzyl salicylate, benzyl benzoate, cyclohexyl salicylate, benzyl phenylacetate, phenylethyl
10 phenylacetate, triacetin, ethyl citrate, methyl and ethyl salicylate, benzyl cinnamate, and mixtures thereof.

In a particular embodiment, the hydrophobic solvent has Hansen Solubility Parameters compatible with entrapped perfume oil.

The term "Hansen solubility parameter" is understood refers to a solubility
15 parameter approach proposed by Charles Hansen used to predict polymer solubility and was developed around the basis that the total energy of vaporization of a liquid consists of several individual parts. To calculate the "weighted Hansen solubility parameter" one must combine the effects of (atomic) dispersion forces, (molecular) permanent dipole-permanent dipole forces, and (molecular) hydrogen bonding
20 (electron exchange). The weighted Hansen solubility parameter" is calculated as $(\delta D^2 + \delta P^2 + \delta H^2)^{0.5}$, wherein δD is the Hansen dispersion value (also referred to in the following as the atomic dispersion fore), δP is the Hansen polarizability value (also referred to in the following as the dipole moment), and δH is the Hansen Hydrogen-bonding ("h-bonding") value (also referred to in the following as hydrogen bonding).
25 For a more detailed description of the parameters and values, see Charles Hansen, The Three Dimensional Solubility Parameter and Solvent Diffusion Coefficient, Danish Technical Press (Copenhagen, 1967).

Euclidean difference in solubility parameter between a fragrance and a solvent is calculated as $(4 * (\delta D_{\text{solvent}} - \delta D_{\text{fragrance}})^2 + (\delta P_{\text{solvent}} - \delta P_{\text{fragrance}})^2 + (\delta H_{\text{solvent}} - \delta H_{\text{fragrance}})^2)^{0.5}$, in which $\delta D_{\text{solvent}}$, $\delta P_{\text{solvent}}$, and $\delta H_{\text{solvent}}$, are the Hansen dispersion
30 value, Hansen polarizability value, and Hansen h-bonding values of the solvent, respectively; and $\delta D_{\text{fragrance}}$, $\delta P_{\text{fragrance}}$, and $\delta H_{\text{fragrance}}$ are the Hansen dispersion value,

Hansen polarizability value, and Hansen h-bonding values of the fragrance, respectively.

In a particular embodiment, the perfume oil and the hydrophobic solvent have at least two Hansen solubility parameters selected from a first group consisting of: an atomic dispersion force (δD) from 12 to 20, a dipole moment (δP) from 1 to 8, and a hydrogen bonding (δH) from 2.5 to 11.

In a particular embodiment, the perfume oil and the hydrophobic solvent have at least two Hansen solubility parameters selected from a second group consisting of: an atomic dispersion force (δD) from 12 to 20, preferably from 14 to 20, a dipole moment (δP) from 1 to 8, preferably from 1 to 7, and a hydrogen bonding (δH) from 2.5 to 11, preferably from 4 to 11.

In a particular embodiment, at least 90% of the perfume oil, preferably at least 95% of the perfume oil, most preferably at least of 98% of the perfume oil has at least two Hansen solubility parameters selected from a first group consisting of: an atomic dispersion force (δD) from 12 to 20, a dipole moment (δP) from 1 to 8, and a hydrogen bonding (δH) from 2.5 to 11.

In a particular embodiment, the perfume oil and the hydrophobic solvent have at least two Hansen solubility parameters selected from a second group consisting of: an atomic dispersion force (δD) from 12 to 20, preferably from 14 to 20, a dipole moment (δP) from 1 to 8, preferably from 1 to 7, and a hydrogen bonding (δH) from 2.5 to 11, preferably from 4 to 11.

According to an embodiment, the perfuming formulation comprises a fragrance modulator (that can be used in addition to the hydrophobic solvent when present or as substitution of the hydrophobic solvent when there is no hydrophobic solvent).

Preferably, the fragrance modulator is defined as a fragrance material with

- i. a vapor pressure of less than 0.0008 Torr at 22°C;
- ii. a clogP of 3.5 and higher, preferable 4.0 and higher and more preferable 4.5
- iii. at least two Hansen solubility parameters selected from a first group consisting of: an atomic dispersion force from 12 to 20, a dipole moment from 1 to 7, and a hydrogen bonding from 2.5 to 11,
- iv. at least two Hansen solubility parameters selected from a second group consisting of: an atomic dispersion force from 14 to 20, a dipole moment from 1 to 8, and a hydrogen bonding from 4 to 11, when in solution with

a compound having a vapor pressure range of 0.0008 to 0.08 Torr at 22°C.

Preferably, as examples the following ingredients can be listed as modulators but the list is not limited to the following materials: alcohol C12, oxacyclohexadec-
 5 12/13-en-2-one, 3-[(2',2',3'-trimethyl-3'-cyclopenten-1'-yl)methoxy]-2-butanol, cyclohexadecanone, (Z)-4-cyclopentadecen-1-one, cyclopentadecanone, (8Z)-oxacycloheptadec-8-en-2-one, 2-[5-(tetrahydro-5-methyl-5-vinyl-2-furyl)-tetrahydro-5-methyl-2-furyl]-2-propanol, muguet aldehyde, 1,5,8-trimethyl-13-oxabicyclo[10.1.0]trideca-4,8-diene, (+)-4,6,6,7,8,8-hexamethyl-1,3,4,6,7,8-
 10 hexahydrocyclopenta[g]isochromene, (+)-(1S,2S,3S,5R)-2,6,6-trimethylspiro[bicyclo[3.1.1]heptane-3,1'-cyclohexane]-2'-en-4'-one, oxacyclohexadecan-2-one, 2-[(1S)-1-[(1R)-3,3-dimethylcyclohexyl]ethoxy]-2-oxoethyl propionate, (+)-(4R,4aS,6R)-4,4a-dimethyl-6-(1-propen-2-yl)-4,4a,5,6,7,8-hexahydro-2(3H)-naphthalenone, amylcinnamic aldehyde, hexylcinnamic aldehyde,
 15 hexyl salicylate, (1E)-1-(2,6,6-trimethyl-1-cyclohexen-1-yl)-1,6-heptadien-3-one, (9Z)-9-cycloheptadecen-1-one.

According to a particular embodiment, the hydrophobic material is free of any active ingredient (such as perfume). According to this particular embodiment, it comprises, preferably consists of hydrophobic solvents, preferably chosen in the group
 20 consisting of isopropyl myristate, triglycerides (e.g. Neobee® MCT oil, vegetable oils), D-limonene, silicone oil, mineral oil, and mixtures thereof with optionally hydrophilic solvents preferably chosen in the group consisting of 1,4-butanediol, benzyl alcohol, triethyl citrate, triacetin, benzyl acetate, ethyl acetate, propylene glycol (1,2-propanediol), 1,3-propanediol, dipropylene glycol, glycerol, glycol ethers and mixtures
 25 thereof.

The term "biocide" refers to a chemical substance capable of killing living organisms (e.g. microorganisms) or reducing or preventing their growth and/or accumulation. Biocides are commonly used in medicine, agriculture, forestry, and in industry where they prevent the fouling of, for example, water, agricultural products
 30 including seed, and oil pipelines. A biocide can be a pesticide, including a fungicide, herbicide, insecticide, algicide, molluscicide, miticide and rodenticide; and/or an antimicrobial such as a germicide, antibiotic, antibacterial, antiviral, antifungal, antiprotozoal and/or antiparasite.

As used herein, a "pest control agent" indicates a substance that serves to repel or attract pests, to decrease, inhibit or promote their growth, development or their activity. Pests refer to any living organism, whether animal, plant or fungus, which is invasive or troublesome to plants or animals, pests include insects notably arthropods, mites, spiders, fungi, weeds, bacteria and other microorganisms.

By "flavor oil", it is meant here a flavoring ingredient or a mixture of flavoring ingredients, solvents or adjuvants of current use for the preparation of a flavoring formulation, i.e. a particular mixture of ingredients which is intended to be added to an edible composition or chewable product to impart, improve or modify its organoleptic properties, in particular its flavor and/or taste. Flavoring ingredients are well known to a person skilled in the art and their nature does not warrant a detailed description here, which in any case would not be exhaustive, the skilled flavorist being able to select them on the basis of his general knowledge and according to the intended use or application and the organoleptic effect it is desired to achieve. Many of these flavoring ingredients are listed in reference texts such as in the book by S. Arctander, *Perfume and Flavor Chemicals*, 1969, Montclair, N.J., USA, or its more recent versions, or in other works of similar nature such as *Fenaroli's Handbook of Flavor Ingredients*, 1975, CRC Press or *Synthetic Food Adjuncts*, 1947, by M. B. Jacobs, van Nostrand Co., Inc. Solvents and adjuvants of current use for the preparation of a flavoring formulation are also well known in the art.

In a particular embodiment, the flavor is a mint flavor. In a more particular embodiment, the mint is selected from the group consisting of peppermint and spearmint.

In a further embodiment, the flavor is a cooling agent or mixtures thereof.

In another embodiment, the flavor is a menthol flavor.

Flavors that are derived from or based on fruits where citric acid is the predominant, naturally-occurring acid include but are not limited to, for example, citrus fruits (e.g. lemon, lime), limonene, strawberry, orange, and pineapple. In one embodiment, the flavors food is lemon, lime or orange juice extracted directly from the fruit. Further embodiments of the flavor comprise the juice or liquid extracted from oranges, lemons, grapefruits, key limes, citrons, clementines, mandarins, tangerines, and any other citrus fruit, or variation or hybrid thereof. In a particular embodiment, the flavor comprises a liquid extracted or distilled from oranges, lemons, grapefruits, key limes, citrons, clementines, mandarins, tangerines, any other citrus fruit or

variation or hybrid thereof, pomegranates, kiwifruits, watermelons, apples, bananas, blueberries, melons, ginger, bell peppers, cucumbers, passion fruits, mangos, pears, tomatoes, and strawberries.

In a particular embodiment, the flavor comprises a composition that comprises limonene, in a particular embodiment, the composition is a citrus that further comprises limonene.

In another particular embodiment, the flavor comprises a flavor selected from the group comprising strawberry, orange, lime, tropical, berry mix, and pineapple.

The phrase flavor includes not only flavors that impart or modify the smell of foods but include taste imparting or modifying ingredients. The latter do not necessarily have a taste or smell themselves but are capable of modifying the taste that other ingredients provides, for instance, salt enhancing ingredients, sweetness enhancing ingredients, umami enhancing ingredients, bitterness blocking ingredients and so on.

In a further embodiment, suitable sweetening components may be included in the particles described herein. In a particular embodiment, a sweetening component is selected from the group consisting of sugar (e.g., but not limited to sucrose), a stevia component (such as but not limited to stevioside or rebaudioside A), sodium cyclamate, aspartame, sucralose, sodium saccharine, and Acesulfam K or mixtures thereof.

Amino-compound

According to an embodiment, the carrier, preferably the shell, comprises an amino compound, preferably in an amount comprised between 0.01 and 5%, preferably 0.1 and 3% by weight based on the total weight of the slurry or based on the total weight of the microcapsule.

According to an embodiment, the amino compound is not RNA.

According to an embodiment, the amino compound is chosen in the group consisting of polylysine, chitosan, cationic guar, peptide, amino-acid, protein, and mixtures thereof.

The protein may be native, partially or completely denaturated by any suitable method. Denaturation is a process which modify the conformational structure of a protein by unfolding, i.e., it involves the disruption and possible destruction of both the secondary and tertiary structures of the protein. Indeed, denaturation implicates the breaking of many of the weak linkages, or bonds (e.g., hydrogen bonds), within a

protein molecule that are responsible for the highly ordered structure of the protein in its native state. Denaturation is reversible (the proteins can regain their native state when the denaturing influence is removed) or irreversible.

Denaturation can be brought about in various ways. Proteins can be denatured
 5 by exposure to temperature, radiation or mechanical stress including shear, changes in pH (treatment with a base or an acid), treatment with oxidizing or reducing agents, inorganic salt, certain organic solvents, chaotropic agents (i.e, compounds having a positive chaotropic value - kJ Kg^{-1} mole on the Hallsworth Scale - such as guanidine salts - e.g., guanidine carbonate, guanidine hydrochloride -, urea, calcium chloride, n-
 10 butanol, ethanol, lithium perchlorate, lithium acetate, magnesium chloride, phenol, 2-propanol, sodium dodecyl sulfate, thiourea).

The protein can also be derivatized or modified (e.g., derivatized or chemically modified). For example, the protein can be modified by covalently attaching sugars, lipids, peptides or chemical groups such as phosphates or methyl.

15 According to an embodiment, the protein is not a peptide.

According to an embodiment, the amino compound is chosen in the group consisting of cystamine, cystamine hydrochloride, cystine, cystine hydrochloride, cystine dialkyl ester, cystine dialkyl ester hydrochloride, a xylylene diamine, 1,2-diaminocyclohexane, 1,4-diaminocyclohexane, polyetheramines, ethylene diamine,
 20 diethylene triamine, spermine, spermidine, polyamidoamine (PAMAM), guanidine carbonate, chitosan, tris-(2-aminoethyl)amine, 1,4 Diaminobutane, 2,2Dimethyl-1,3-propanediamine, 1,3-diaminopentane (Dytek EP diamine), 1,2 Diaminopropane, triethylenetetramine , 1,3-diaminopropane; urea; ethylene urea; aminoguanidine bicarbonate; 1-(2-aminoethyl)imidazolidin-2-one; N-(3-aminopropyl)-N-
 25 dodecylpropane-1,3-diamine; N1-(2-Aminoethyl)-N1-dodecyl-1,2-ethanediamine; aminoethylethanolamine; N1-(3-aminopropyl)propane-1,3-diamine , polyethyleneimine, amino-acid such as lysine, arginine, leucine, histidine, tryptophane, serin, glutamine, threonine, alanine, asparagine, aspartic acid, cysteine, glutamic acid, glycine , isoleucine, methionine, phenylalanine , proline , tyrosine,
 30 valine, and mixtures thereof.

According to an embodiment, the amino compound is a mixture of ethylene diamine and diethylene triamine.

According to an embodiment, the amino compound is a protein such as a plant protein or whey protein, white egg albumin, sodium caseinate, gelatin, bovine serum albumin, hydrolyzed sericin, pseudocollagen, silk protein, sericin powder, and mixtures thereof

5 Preferably the protein is a plant protein.

According to an embodiment, the amino compound is a plant protein, preferably chosen in the group consisting of soy protein, rice protein, whey protein, potato protein, chickpea protein, pea protein, algae protein, faba bean protein, barley protein, oat protein, wheat gluten protein, lupin protein, and mixtures thereof.

10 According to an embodiment, the amino-compound comprises an amino-acid. The amino-acid can be chosen in the group consisting of L-Lysine, L-Arginine, L-Histidine, L-Tryptophane, L-Serin, L-Glutamine, L-Threonine and mixtures thereof, preferably L-Lysine, L-Arginine, L-Histidine, L-Tryptophane and mixtures thereof,

According to a particular embodiment, the carrier, preferably the shell, is cross-linked.

The carrier is preferably cross-linked with UV radiation, glutaraldehyde, glyoxal, formaldehyde, polyphenol (such as tannic acid), polyanhydrides, genipin, transglutaminase and mixtures thereof.

When UV radiation is carried out, a photoinitiator may be used such as 2-hydroxy-4'-(2-hydroxyethoxy)-2-methylpropiophenone.

Outer coating

According to a particular embodiment of the invention, the microcapsule comprises an outer coating, wherein the outer coating comprises a coating material selected from the group consisting of a non-ionic polymer (such as non-ionic polysaccharide), anionic polymer (such as polysaccharide), a cationic polymer, a polysuccinimide derivative (as described for instance in WO2021185724) and mixtures thereof to form an outer coating to the microcapsule.

30 According to a particular embodiment, the microcapsule does not comprise an outer coating.

Polysaccharide polymers are well known to a person skilled in the art. Preferred non-ionic polysaccharides are selected from the group consisting of locust bean gum, xyloglucan, guar gum, hydroxypropyl guar, hydroxypropyl cellulose and hydroxypropyl methyl cellulose, pectin and mixtures thereof.

According to a particular embodiment, the coating consists of a cationic coating.

Cationic polymers are also well known to a person skilled in the art. Preferred cationic polymers have cationic charge densities of at least 0.5 meq/g, more preferably at least about 1.5 meq/g, but also preferably less than about 7 meq/g, more preferably less than about 6.2 meq/g. The cationic charge density of the cationic polymers may be determined by the Kjeldahl method as described in the US Pharmacopoeia under chemical tests for Nitrogen determination. The preferred cationic polymers are chosen from those that contain units comprising primary, secondary, tertiary and/or quaternary amine groups that can either form part of the main polymer chain or can be borne by a side substituent directly connected thereto. The weight average (Mw) molecular weight of the cationic polymer is preferably between 10,000 and 3.5M Dalton, more preferably between 50,000 and 2M Dalton.

According to a particular embodiment, one will use cationic polymers based on acrylamide, methacrylamide, N-vinylpyrrolidone, quaternized N,N-dimethylaminomethacrylate, diallyldimethylammonium chloride, quaternized vinylimidazole (3-methyl-1-vinyl-1H-imidazol-3-ium chloride), vinylpyrrolidone, acrylamidopropyltrimonium chloride, cassia hydroxypropyltrimonium chloride, guar hydroxypropyltrimonium chloride or polygalactomannan 2-hydroxypropyltrimethylammonium chloride ether, starch hydroxypropyltrimonium chloride and cellulose hydroxypropyltrimonium chloride. Preferably copolymers shall be selected from the group consisting of polyquaternium-5, polyquaternium-6, polyquaternium-7, polyquaternium10, polyquaternium-11, polyquaternium-16, polyquaternium-22, polyquaternium-28, polyquaternium-43, polyquaternium-44, polyquaternium-46, cassia hydroxypropyltrimonium chloride, guar hydroxypropyltrimonium chloride or polygalactomannan 2-hydroxypropyltrimethylammonium chloride ether, starch hydroxypropyltrimonium chloride and cellulose hydroxypropyltrimonium chloride.

As specific examples of commercially available products, one may cite Salcare® SC60 (cationic copolymer of acrylamidopropyltrimonium chloride and acrylamide, origin: BASF) or Luviquat®, such as the PQ 11N, FC 550 or Style (polyquaternium-11 to 68 or quaternized copolymers of vinylpyrrolidone origin: BASF), or also the Jaguar® (C13S or C17, origin Rhodia).

According to any one of the above embodiments of the invention, there is added an amount of polymer described above comprised between about 0% and 5% w/w, or

even between about 0.1% and 2% w/w, percentage being expressed on a w/w basis relative to the total weight of the microcapsule. It is clearly understood by a person skilled in the art that only part of said added polymers will be incorporated into/deposited on the microcapsule shell.

5

Solid particles

Another object of the invention is a solid particle comprising:

- a carrier material, preferably a polymeric carrier material chosen in the group consisting of polyvinyl acetate, polyvinyl alcohol, dextrans, natural or modified
- 10 starch, vegetable gums, pectins, xanthans, alginates, carragenans, cellulose derivatives and mixtures thereof, and
- microcapsules as defined above entrapped in said carrier material, and
- optionally free perfume entrapped in said carrier material.

Solid particle as defined above and microcapsule powder can be used

15 indifferently in the present invention.

PROCESS FOR PREPARING MICROCAPSULES

20 In a second aspect, the present invention relates to a process for preparing a delivery system, comprising the following steps:

- Dispersing an oil phase comprising a hydrophobic material into a dispersing phase to obtain a two-phases dispersion,
- Performing a curing step to obtain a delivery system,
- 25 wherein ribonucleic acid is added in the oil phase and/or in the dispersing phase and/or in the two-phases dispersion.

According to an embodiment, the dispersing phase and/or the oil phase comprises an amino compound.

30 The embodiments disclosed for the core-shell microcapsules also apply for the process for preparing core-shell microcapsules.

According to an embodiment, the dispersing phase comprises, preferably consists of water.

According to an embodiment, the dispersing phase is a water phase.

According to an embodiment, the two-phases dispersion is an oil-in-water emulsion.

According to an embodiment, the dispersing phase comprises water and an alcohol
5 such as glycerol, 1,4-butanediol, ethylene glycol and mixtures thereof.

According to an embodiment, the dispersing phase consists of alcohol.

According to an embodiment, a stabilizer is added in the oil phase and/or in the dispersing phase.

By "stabilizer", it is meant a compound capable to stabilize oil/dispersing phase
10 interface (typically oil/water interface) as an emulsion.

The stabilizer is preferably used in an amount comprised between 0.05% to 20 %, preferably between 0.1 to 10%, even more preferably between 0.5 and 5% by weight based on the two-phases dispersion, preferably oil-in-water emulsion.

"Stabilizer" or "emulsifier" can be used indifferently in the present invention.

15 According to an embodiment, the stabilizer is a colloidal stabilizer.

The colloidal stabilizer can be a polymeric emulsifier (standard emulsion), a surfactant, or solid particles (Pickering emulsion).

By "polymeric emulsifier", it meant an emulsifier having both a polar group with an affinity for water (hydrophilic) and a nonpolar group with an affinity for oil
20 (hydrophobic). The hydrophilic part will dissolve in the water phase and the hydrophobic part will dissolve in the oil phase providing a film around droplets.

By "surfactant", it meant a substance with a polar and a non-polar group that is added to the liquid to reduce the liquid surface tension.

According to an embodiment, the surfactant is hexadecyltrimethylammonium
25 bromide.

According to an embodiment, the stabilizer is chosen in the group consisting of inorganic particles or polymeric emulsifier such as polysaccharides, proteins, glycoproteins, and mixtures thereof.

When the stabilizer is solid particles, it can be chosen in the group consisting
30 of calcium phosphate, silica, silicates, titanium dioxide, aluminium oxide, zinc oxide, iron oxide, mica, kaolin, montmorillonite, laponite, bentonite, perlite, dolomite, diatomite, vermiculite, hectorite, gibbsite, illite, kaolinite, aluminosilicates, gypsum, bauxite, magnesite, talc, magnesium carbonate, calcium carbonate, diatomaceous earth and mixtures thereof.

According to a particular embodiment, the stabilizer is a biopolymer.

By "biopolymers" it is meant biomacromolecules produced by living organisms. Biopolymers are characterized by molecular weight distributions ranging from 1,000 (1 thousand) to 1,000,000,000 (1 billion) Daltons. These macromolecules may be carbohydrates (sugar based) or proteins (amino-acid based) or a combination of both (gums) and can be linear or branched.

According to an embodiment, the polymeric emulsifier is chosen in the group consisting of gum Arabic, modified starch, polyvinyl alcohol, polyvinylpyrrolidone (PVP), carboxymethylcellulose (CMC), anionic polysaccharides, acrylamide copolymer, protein such as soy protein, rice protein, whey protein, white egg albumin, sodium caseinate, gelatin, bovine serum albumin, hydrolyzed soy protein, hydrolyzed sericin, pseudocollagen, silk protein, sericin powder, potato protein, chickpea protein, pea protein, algae protein, faba bean protein, barley protein, oat protein, wheat gluten protein, lupin protein, and mixtures thereof.

Potato proteins are typically extracted from potato tuber (*Solanum tuberosum*). According to an embodiment, the potato protein is a native potato protein and preferably patatin.

According to a particular embodiment, RNA acts as a stabilizer.

Polyfunctional monomer

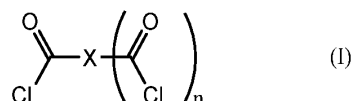
According to a particular embodiment, a polyfunctional monomer is added in the oil phase and/or in the dispersing phase and/or into the two-phases dispersion.

According to an embodiment, the polyfunctional monomer is chosen in the group consisting of at least one acyl chloride, isocyanate, anhydride, epoxide, acrylate, alkoxysilane, aldehyde, and mixtures thereof.

According to an embodiment, when an acyl chloride is used, the molar ratio between the functional groups NH_2 of the at least amino compound and the functional groups COCl of the acyl chloride is comprised between 0.2 and 3, preferably from 0.5 to 2, more preferably between 0.2 and 1.

According to an embodiment, the polyfunctional monomer is added in an amount comprised between from 0.1 to 15%, preferably from 0.5 to 10% and more preferably from 0.8 to 6%, and even more preferably between 1 and 5% by weight, and even more preferably between 1 and 3% based on the total weight of the oil phase and/ or the dispersing phase.

According to a particular embodiment, the acyl chloride has the following formula (I)



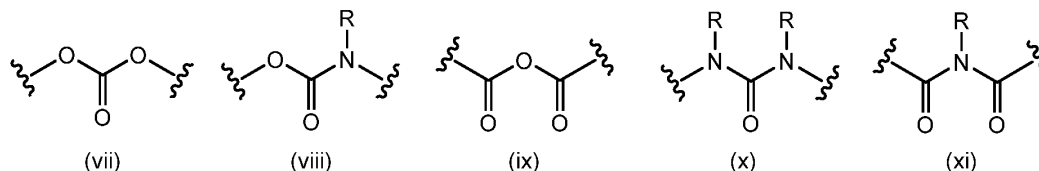
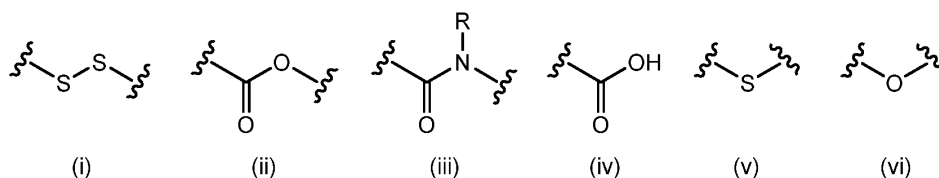
5

wherein n is an integer varying between 1 and 8, preferably between 1 and 6, more preferably

between 1 and 4, and

wherein X is an (n+1)-valent C₂ to C₄₅ hydrocarbon group optionally comprising at

10 least one group selected from (i) to (xi), more particularly selected from (i) to (vi),



15

wherein R is a hydrogen atom or an alkyl group such as a methyl or an ethyl group, preferably a hydrogen atom.

It is understood that by "... **hydrocarbon group** ..." it is meant that said group consists of hydrogen and carbon atoms and can be in the form of an aliphatic hydrocarbon, i.e. linear or branched saturated hydrocarbon (e.g. alkyl group), a linear or branched unsaturated hydrocarbon (e.g. alkenyl or alkynyl group), a saturated cyclic hydrocarbon (e.g. cycloalkyl) or an unsaturated cyclic hydrocarbon (e.g. cycloalkenyl or cycloalkynyl), or can be in the form of an aromatic hydrocarbon, i.e. aryl group, or can also be in the form of a mixture of said type of groups, e.g. a specific group may

comprise a linear alkyl, a branched alkenyl (e.g. having one or more carbon-carbon double bonds), a (poly)cycloalkyl and an aryl moiety, unless a specific limitation to only one type is mentioned. Similarly, in all the embodiments of the invention, when a group is mentioned as being in the form of more than one type of topology (e.g. linear, cyclic
 5 or branched) and/or being saturated or unsaturated (e.g. alkyl, aromatic or alkenyl), it is also meant a group which may comprise moieties having any one of said topologies or being saturated or unsaturated, as explained above. Similarly, in all the embodiments of the invention, when a group is mentioned as being in the form of one type of saturation or unsaturation, (e.g. alkyl), it is meant that said group can be in any
 10 type of topology (e.g. linear, cyclic or branched) or having several moieties with various topologies.

It is understood that with the term "... **a hydrocarbon group, optionally comprising ...**" it is meant that said hydrocarbon group optionally comprises heteroatoms to form ether, thioether, amine, nitrile or carboxylic acid groups and
 15 derivatives (including for example esters, acids, amide). These groups can either substitute a hydrogen atom of the hydrocarbon group and thus be laterally attached to said hydrocarbon, or substitute a carbon atom (if chemically possible) of the hydrocarbon group and thus be inserted into the hydrocarbon chain or ring.

According to a particular embodiment, the acyl chloride is chosen from the
 20 group consisting of benzene-1,3,5-tricarbonyl trichloride (trimesoyl trichloride), benzene-1,2,4-tricarbonyl trichloride, benzene-1,2,4,5-tetracarbonyl tetrachloride, cyclohexane-1,3,5-tricarbonyl trichloride, isophthaloyl dichloride, diglycolyl dichloride, terephthaloyl chloride, fumaryl dichloride, adipoyl chloride, succinic dichloride, propane-1,2,3-tricarbonyl trichloride, cyclohexane-1,2,4,5-tetracarbonyl tetrachloride,
 25 2,2'-disulfanediylsuccinyl dichloride, 2-(2-chloro-2-oxo-ethyl)sulfanylbutanedioyl dichloride, (4-chloro-4-oxobutanoyl)-L-glutamoyl dichloride, (S)-4-((1,5-dichloro-1,5-dioxopentan-2-yl)amino)-4-oxobutanoic acid, 2,2-bis[(4-chloro-4-oxobutanoyl)oxymethyl]butyl 4-chloro-4-oxo-butanoate, [2-[2,2-bis[(4-chloro-4-oxobutanoyl)oxymethyl]butoxymethyl]-2-[(4-chloro-4-oxo-butanoyl)oxymethyl]butyl] 4-
 30 chloro-4-oxo-butanoate, 2,2-bis[(2-chlorocarbonylbenzoyl)oxymethyl]butyl 2-chlorocarbonyl-benzoate, [2-[2,2-bis[(2-chlorocarbonylbenzoyl)oxymethyl]butoxymethyl]-2-[(2-chlorocarbonylbenzoyl)oxymethyl]butyl] 2-chlorocarbonylbenzoate, 4-(2,4,5-trichlorocarbonylbenzoyl)oxybutyl 2,4,5-trichlorocarbonyl-benzoate, propane-1,2,3-

triyl tris(4-chloro-4-oxobutanoate), propane-1,2-diyl bis(4-chloro-4-oxobutanoate) and mixtures thereof.

According to a particular embodiment, the acyl chloride is chosen from the group consisting of benzene-1,2,4-tricarbonyl trichloride, benzene-1,2,4,5-tetracarboxyl tetrachloride, cyclohexane-1,3,5-tricarbonyl trichloride, isophthaloyl dichloride, diglycolyl dichloride, terephthaloyl chloride, fumaryl dichloride, adipoyl dichloride, succinic dichloride, propane-1,2,3-tricarbonyl trichloride, cyclohexane-1,2,4,5-tetracarboxyl tetrachloride, 2,2'-disulfanediyl disuccinyl dichloride, 2-(2-chloro-2-oxo-ethyl)sulfanylbutanedioyl dichloride, (4-chloro-4-oxobutanoyl)-L-glutamoyl dichloride, (S)-4-((1,5-dichloro-1,5-dioxopentan-2-yl)amino)-4-oxobutanoic acid, 2,2-bis[(4-chloro-4-oxo-butanoyl)oxymethyl]butyl 4-chloro-4-oxo-butanoate, [2-[2,2-bis[(4-chloro-4-oxo-butanoyl)oxymethyl]butoxymethyl]-2-[(4-chloro-4-oxo-butanoyl)oxymethyl]butyl] 4-chloro-4-oxo-butanoate, 2,2-bis[(2-chlorocarbonylbenzoyl)oxymethyl]butyl 2-chlorocarbonyl-benzoate, [2-[2,2-bis[(2-chlorocarbonylbenzoyl)oxymethyl]butoxymethyl]-2-[(2-chlorocarbonylbenzoyl)oxymethyl]butyl] 2-chlorocarbonylbenzoate, 4-(2,4,5-trichlorocarbonylbenzoyl)oxybutyl 2,4,5-trichlorocarbonyl-benzoate, propane-1,2,3-triyl tris(4-chloro-4-oxobutanoate), propane-1,2-diyl bis(4-chloro-4-oxobutanoate), and mixtures thereof.

According to another particular embodiment, the acyl chloride is chosen from the group consisting of fumaryl dichloride, adipoyl dichloride, succinic dichloride, propane-1,2,3-triyl tris(4-chloro-4-oxobutanoate), propane-1,2-diyl bis(4-chloro-4-oxobutanoate), and mixtures thereof.

According to an embodiment, the acyl chloride is a mixture of acyl chlorides.

The weight ratio between acyl chloride and the hydrophobic material is preferably comprised between 0.01 and 0.09, more preferably between 0.02 and 0.07.

According to a particular embodiment, the acyl chloride is used in an amount comprised between 1.7 and 7%, preferably between 2.5 and 5 % by weight based on the total weight of the hydrophobic material.

According to a particular embodiment, the polyfunctional monomer is a polyisocyanate having at least two isocyanate functional groups.

Suitable polyisocyanates used according to the invention can include aromatic polyisocyanate, aliphatic polyisocyanate and mixtures thereof. Said polyisocyanate comprises at least 2, preferably at least 3 but may comprise up to 6, or even only 4,

isocyanate functional groups. According to a particular embodiment, a triisocyanate (3 isocyanate functional group) is used.

According to one embodiment, said polyisocyanate is an aromatic polyisocyanate.

5 The term “aromatic polyisocyanate” is meant here as encompassing any polyisocyanate comprising an aromatic moiety. Preferably, it comprises a phenyl, a toluyl, a xylyl, a naphthyl or a diphenyl moiety, more preferably a toluyl or a xylyl moiety. Preferred aromatic polyisocyanates are biurets, polyisocyanurates and trimethylol propane adducts of diisocyanates, more preferably comprising one of the
10 above-cited specific aromatic moieties. More preferably, the aromatic polyisocyanate is a polyisocyanurate of toluene diisocyanate (commercially available from Bayer under the tradename Desmodur® RC), a trimethylol propane-adduct of toluene diisocyanate (commercially available from Bayer under the tradename Desmodur® L75), a trimethylol propane-adduct of xylylene diisocyanate (commercially available
15 from Mitsui Chemicals under the tradename Takenate® D-110N). In a most preferred embodiment, the aromatic polyisocyanate is a trimethylol propane-adduct of xylylene diisocyanate.

According to another embodiment, said polyisocyanate is an aliphatic polyisocyanate. The term “aliphatic polyisocyanate” is defined as a polyisocyanate
20 which does not comprise any aromatic moiety. Preferred aliphatic polyisocyanates are a trimer of hexamethylene diisocyanate, a trimer of isophorone diisocyanate, a trimethylol propane-adduct of hexamethylene diisocyanate (available from Mitsui Chemicals) or a biuret of hexamethylene diisocyanate (commercially available from Bayer under the tradename Desmodur® N 100), among which a biuret of
25 hexamethylene diisocyanate is even more preferred.

According to another embodiment, the at least one polyisocyanate is in the form of a mixture of at least one aliphatic polyisocyanate and of at least one aromatic polyisocyanate, both comprising at least two or three isocyanate functional groups, such as a mixture of a biuret of hexamethylene diisocyanate with a trimethylol
30 propane-adduct of xylylene diisocyanate, a mixture of a biuret of hexamethylene diisocyanate with a polyisocyanurate of toluene diisocyanate and a mixture of a biuret of hexamethylene diisocyanate with a trimethylol propane-adduct of toluene diisocyanate. Most preferably, it is a mixture of a biuret of hexamethylene diisocyanate with a trimethylol propane-adduct of xylylene diisocyanate. Preferably, when used as

a mixture the molar ratio between the aliphatic polyisocyanate and the aromatic polyisocyanate is ranging from 80:20 to 10:90.

According to an embodiment, a reactant chosen in the group consisting in alcohols, amines (or amino compound), phenols, thiols is added in the dispersing
5 phase and/or the oil phase.

According to an embodiment, when the delivery system is a coacervate core-shell microcapsules, the core-shell microcapsules are prepared by a process comprising the steps of:

- 10 (i) providing a hydrophobic phase comprising a hydrophobic material and at least a polyfunctional monomer;
- (ii) mixing a first polyelectrolyte and ribonucleic acid (RNA) in a dispersing phase; wherein the first polyelectrolyte comprises a protein, preferably a plant-protein;
- (iii) adding the hydrophobic phase into the dispersing phase to form a two
15 phases dispersion and applying sufficient condition to form a coacervate,
- (iv) providing conditions sufficient to induce interfacial polymerization to form a core- shell microcapsule slurry.

According to an embodiment, the microcapsules of the invention (first type of
20 microcapsule) can be used in combination with a second type of microcapsules.

Another object of the invention is a microcapsule delivery system comprising:

- the microcapsules of the present invention as a first type of microcapsule, and
- a second type of microcapsules, wherein the first type of microcapsule and
25 the second type of microcapsules differ in their hydrophobic material and/or their wall material and/or in their coating material.

The wall of the second type of microcapsules can vary. As non-limiting examples, the polymer shell of the second type of microcapsules comprises a material selected from the group consisting of polyurea, polyurethane, polyamide, polyhydroxyalkanoates, polyacrylate, polyesters, polyaminoesters, polyepoxides, polysiloxane, polycarbonate,
30 polysulfonamide, urea formaldehyde, melamine formaldehyde resin, melamine formaldehyde resin cross-linked with polyisocyanate or aromatic polyols, melamine urea resin, melamine glyoxal resin, gelatin/ gum arabic shell wall, and mixtures thereof.

PERFUMING COMPOSITION AND CONSUMER PRODUCTS

The present invention also relates to a perfuming composition comprising:

- a core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above,
- at least one ingredient selected from the group consisting of a perfumery carrier and a perfumery base, and
- optionally, at least one perfumery adjuvant.

In a particular embodiment, the composition comprises:

(i) a core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above;

(ii) an active ingredient, preferably chosen in the group consisting of a cosmetic ingredient, skin caring ingredient, perfume ingredient, flavor ingredient, malodour counteracting ingredient, bactericide ingredient, fungicide ingredient, pharmaceutical or agrochemical ingredient, a sanitizing ingredient, an insect repellent or attractant, and mixtures thereof.

In a particular embodiment, a core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above can also be added in different perfumed consumer products

In a particular embodiment, present invention relates to a perfuming composition comprising

- a core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above and
- optionally, a free perfume oil.

Preferably, the perfuming composition according to the invention comprises between 0.1 and 30 % by weight of a core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above.

By "free perfume" it is herein understood a perfume or perfume oil which is comprised in the perfuming composition and not entrapped in the core-shell

microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above.

In a particular embodiment, the total amount of the core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above is 0.05 to 5 wt.% (based on the total weight of the perfuming composition) and the total amount of the free perfume oil is 0.05 to 5 wt.% (based on the total weight of the perfuming composition).

In a particular embodiment, the total perfume oil of the perfume formulation entrapped in the core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above and total free perfume oil are present in the perfuming composition in a weight ratio of 1:20 to 20:1, preferably 10:1 to 1:10.

The perfuming composition can further comprise at least one perfuming co-ingredient and, optionally a perfumery adjuvant,

By "perfuming co-ingredient" it is herein understood a compound, which is used in a perfuming preparation or a composition to impart a hedonic effect and which is not a microcapsule as 20 defined above. In other words such a co-ingredient, to be considered as being a perfuming one, must be recognized by a person skilled in the art as being able to impart or modify in a positive or pleasant way the odor of a composition, and not just as having an odor. The nature and type of the perfuming co-ingredients present in the perfuming composition do not warrant a more detailed description here, which in any case would not be exhaustive, the skilled person being able to select them on the basis of his general knowledge and according to the intended use or application and the desired organoleptic effect. In general terms, these perfuming co-ingredients belong to chemical classes as varied as alcohols, lactones, aldehydes, ketones, esters, ethers, acetates, nitriles, terpenoids, nitrogenous or sulfur heterocyclic compounds and essential oils, and said perfuming co-ingredients can be of natural or synthetic origin. Many of these co-30 ingredients are in any case listed in reference texts such as the book by S. Arctander, Perfume and Flavor Chemicals, 1969, Montclair, New Jersey, USA, or its more recent versions, or in other works of a similar nature, as well as in the abundant patent literature in the field of perfumery. It is also understood that said co-ingredients may also be compounds known to release in a controlled manner various types of perfuming compounds.

By "perfumery adjuvant" it is herein understood an ingredient capable of imparting additional 5 added benefit such as a color, a particular light resistance, chemical stability, etc. A detailed description of the nature and type of adjuvant commonly used in perfuming bases cannot be exhaustive, but it has to be mentioned
5 that said ingredients are well known to a person skilled in the art.

According to an embodiment, the core-shell microcapsules or core-shell microcapsules slurries obtained by the process according to the present invention or as described herein-above (first type of delivery system) can be used in combination with a second type of delivery system.

10 Thus, according to a particular embodiment, the perfuming composition comprises:

- the core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above as a first type of delivery system, and
- a second type of delivery system, wherein the first type of delivery system and
15 the second type of delivery system differ in their perfuming formulations and/or carrier material (shell or matrix) and/or outer coating.

The core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above can advantageously be used in many application fields and used in consumer products.

20 The present invention also relates to a perfumed consumer product comprising

- a core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above, and
- a personal care, home care, or fabric care active base.

25 The consumer products of the invention, can in particular be of used in perfumed consumer products such as product belonging to fine fragrance or "functional" perfumery. Functional perfumery includes in particular personal-care products including hair-care, body cleansing, skin care, hygiene-care as well as home-care products including laundry care and air care.

30 In particular a liquid consumer product comprising:

- from 2 to 65% by weight, relative to the total weight of the consumer product, of at least one surfactant;
- water or a water-miscible hydrophilic organic solvent; and

- a perfuming composition or the core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above.

Also a powder consumer product comprising

- 5 - from 2 to 65% by weight, relative to the total weight of the consumer product, of at least one surfactant; and
- a perfuming composition or the core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above.

10 For the sake of clarity, it has to be mentioned that, by “perfumed consumer product” it is meant a consumer product which is expected to deliver among different benefits a perfuming effect to the surface to which it is applied (e.g. skin, hair, textile, paper, or home surface) or in the air (air-freshener, deodorizer etc). In other words, a perfumed consumer product according to the invention is a manufactured product

15 which comprises a functional formulation also referred to as “base”, together with benefit agents, among which an effective amount of microcapsules according to the invention.

The nature and type of the other constituents of the perfumed consumer product do not warrant a more detailed description here, which in any case would not be

20 exhaustive, the skilled person being able to select them on the basis of his general knowledge and according to the nature and the desired effect of said product. Base formulations of consumer products in which the microcapsules of the invention can be incorporated can be found in the abundant literature relative to such products. These formulations do not warrant a detailed description here which would in any case not

25 be exhaustive. The person skilled in the art of formulating such consumer products is perfectly able to select the suitable components on the basis of his general knowledge and of the available literature.

Non-limiting examples of suitable perfumed consumer products can be a fine perfume, a splash or eau de perfume, a cologne, a shave or after-shave lotion, a liquid

30 or solid detergent, a mono or multi chamber unidose detergent, a fabric softener, a fabric refresher, liquid or solid scent-boosters (PEG / urea or salts), a dryer sheet, an ironing water, a paper, a bleach, a carpet cleaners, curtain-care products, a shampoo, a coloring preparation, a color care product, a hair shaping product, a dental care product, a disinfectant, an intimate care product, a hair spray, a hair conditioning

product, a vanishing cream, a deodorant or antiperspirant, hair remover, tanning or sun product, nail products, skin cleansing, a makeup, a perfumed soap, shower or bath mousse, oil or gel, or a foot/hand care products, a hygiene product, an air freshener, a "ready to use" powdered air freshener, a mold remover, furnisher care, wipe, a dish detergent or hard-surface detergent, a leather care product, a car care product.

In a particular embodiment, the perfumed consumer product is preferably selected from the group consisting of personal care composition, home care composition or fabric care composition, most preferably in form of antiperspirants, hair care products, such as shampoo or hair-conditioner, body care products such as a shower gel, oral care products, laundry care products, preferably a detergent or a fabric softener.

Another object of the invention is a consumer product comprising:

- a personal care active base, and
- the core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above or the perfuming composition as defined above,

wherein the consumer product is in the form of a personal care composition.

Personal care active base in which the delivery system of the invention can be incorporated can be found in the abundant literature relative to such products. These formulations do not warrant a detailed description here which would in any case not be exhaustive. The person skilled in the art of formulating such consumer products is perfectly able to select the suitable components on the basis of his general knowledge and of the available literature.

The personal care composition is preferably chosen in the group consisting of a hair-care product (e.g. a shampoo, hair conditioner, a coloring preparation or a hair spray), a cosmetic preparation (e.g. a vanishing cream, body lotion or a deodorant or antiperspirant), a skin-care product (e.g. a perfumed soap, shower or bath mousse, body wash, oil or gel, bath salts, or a hygiene product), oral care product (toothpaste or mouthwash composition) or a fine fragrance product (e.g. Eau de Toilette - EdT).

Another object of the invention is a consumer product comprising:

- a home care or a fabric care active base, and

- a core-shell microcapsule or core-shell microcapsule slurry obtained by the process according to the present invention or as described herein-above or the perfuming composition as defined above,

wherein the consumer product is in the form of a home care or a fabric care composition.

Home care or fabric care bases in which the delivery system of the invention can be incorporated can be found in the abundant literature relative to such products. These formulations do not warrant a detailed description here which would in any case not be exhaustive. The person skilled in the art of formulating such consumer products is perfectly able to select the suitable components on the basis of his general knowledge and of the available literature.

The home or fabric care composition is preferably chosen in the group consisting fabric softener, liquid detergent, powder detergent, liquid scent booster and solid scent booster.

Fabric softener

An object of the invention is a consumer product in the form of a fabric softener composition comprising:

- a fabric softener active base; preferably comprising at least one active material chosen in the group consisting of dialkyl quaternary ammonium salts, dialkyl ester quaternary ammonium salts (esterquats), Hamburg esterquat (HEQ), TEAQ (triethanolamine quat), silicones and mixtures thereof, the active base being used preferably in an amount comprised between 85 and 99.95% by weight based on the total weight of the composition,
- microcapsules or a microcapsule slurry as defined above, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

Liquid detergent

An object of the invention is a consumer product in the form of a liquid detergent composition comprising:

- a liquid detergent active base; preferably comprising at least one active material chosen in the group consisting of anionic surfactant such as alkylbenzenesulfonate (ABS), secondary alkyl sulfonate (SAS), primary alcohol sulfate (PAS), lauryl ether sulfate (LES), methyl ester sulfonate (MES) and nonionic surfactant such as alkyl amines, alkanolamide, fatty alcohol poly(ethylene glycol) ether, fatty alcohol ethoxylate (FAE), ethylene oxide (EO) and propylene oxide (PO) copolymers, amine oxydes, alkyl polyglucosides, alkyl polyglucosamides, the active base being used preferably in an amount comprised between 85 and 99.95% by weight based on the total weight of the composition,
- microcapsules or a microcapsule slurry as defined above, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

Solid detergent

An object of the invention is a consumer product in the form of a solid detergent composition comprising:

- a solid detergent active base; preferably comprising at least one active material chosen in the group consisting of anionic surfactant such as alkylbenzenesulfonate (ABS), secondary alkyl sulfonate (SAS), primary alcohol sulfate (PAS), lauryl ether sulfate (LES), methyl ester sulfonate (MES) and nonionic surfactant such as alkyl amines, alkanolamide, fatty alcohol poly(ethylene glycol) ether, fatty alcohol ethoxylate (FAE), ethylene oxide (EO) and propylene oxide (PO) copolymers, amine oxydes, alkyl polyglucosides, alkyl polyglucosamides, the active base being used preferably in an amount comprised between 85 and 99.95% by weight based on the total weight of the composition,
- a microcapsule powder or microcapsule slurry as defined above, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

Shampoo/shower gel

An object of the invention is a consumer product in the form of a shampoo or a shower gel composition comprising:

- a shampoo or a shower gel active base; preferably comprising at least one active material chosen in the group consisting of sodium alkylether sulfate, ammonium alkylether sulfates, alkylamphoacetate, cocamidopropyl betaine, cocamide MEA, alkylglucosides and aminoacid based surfactants and mixtures thereof, the active base being used preferably in an amount comprised between 85 and 99.95% by weight based on the total weight of the composition,
- microcapsules or a microcapsule slurry as defined above, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

Rinse-Off Conditioner

An object of the invention is a consumer product in the form of a rinse-off conditioner composition comprising:

- a rinse-off conditioner active base; preferably comprising at least one active material chosen in the group consisting of cetyltrimonium chloride, stearyl trimonium chloride, benzalkonium chloride, behentrimonium chloride and mixture thereof, the active base being used preferably in an amount comprised between 85 and 99.95% by weight based on the total weight of the composition,
- microcapsules or a microcapsule slurry as defined above, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

Solid scent booster

An object of the invention is a consumer product in the form of a solid scent booster composition comprising:

- a solid carrier, preferably chosen in the group consisting of urea, sodium chloride, sodium sulphate, sodium acetate, zeolite, sodium carbonate, sodium bicarbonate, clay, talc, calcium carbonate, magnesium sulfate, gypsum,

calcium sulfate, magnesium oxide, zinc oxide, titanium dioxide, calcium chloride, potassium chloride, magnesium chloride, zinc chloride, saccharides such as sucrose, mono-, di-, and polysaccharides and derivatives such as starch, cellulose, methyl cellulose, ethyl cellulose, propyl cellulose, polyols/sugar alcohols such as sorbitol, maltitol, xylitol, erythritol, and isomalt, PEG, PVP, citric acid or any water soluble solid acid, fatty alcohols or fatty acids and mixtures thereof,

- microcapsules or a microcapsule slurry as defined above, in a powdered form, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

Liquid scent booster

An object of the invention is a consumer product in the form of a liquid scent booster composition comprising:

- an aqueous phase,
- a surfactant system essentially consisting of one or more than one non-ionic surfactant, wherein the surfactant system has a mean HLB between 10 and 14, preferably chosen in the group consisting of ethoxylated aliphatic alcohols, POE/PPG (polyoxyethylene and polyoxypropylene) ethers, mono and polyglyceryl esters, sucrose ester compounds, polyoxyethylene hydroxylesters, alkyl polyglucosides, amine oxides and combinations thereof;
- a linker chosen in the group consisting of alcohols, salts and esters of carboxylic acids, salts and esters of hydroxyl carboxylic acids, fatty acids, fatty acid salts, glycerol fatty acids, surfactant having an HLB less than 10 and mixtures thereof, and
- microcapsules or a microcapsule slurry as defined above, in the form of a slurry, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

Hair coloration

An object of the invention is a consumer product in the form of an oxidative hair coloring composition comprising:

- an oxidizing phase comprising an oxidizing agent and an alkaline phase comprising an alkali agent, a dye precursor and a coupling compound; wherein said dye precursor and said coupling compound form an oxidative hair dye in the presence of the oxidizing agent, preferably in an amount comprised between 85 and 99.95% by weight based on the total weight of the composition,
- microcapsules or a microcapsule slurry as defined above, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

Perfuming composition

- According to a particular embodiment, the consumer product is in the form of a perfuming composition comprising:
- 0.1 to 30%, preferably 0.1 to 20% of microcapsules or a microcapsule slurry as defined previously,
 - 0 to 40%, preferably 3-40% of perfume, and
 - 20-90%, preferably 40-90% of ethanol, by weight based on the total weight of the perfuming composition.

The invention will now be further described by way of examples. It will be appreciated that the invention as claimed is not intended to be limited in any way by these examples.

EXAMPLES

Example 1

Preparation of microcapsules according to the present invention

5

Microcapsules A to D were prepared as follows.

General protocol:

Oil phase preparation:

10

The ribonucleic acid was dispersed in the perfume (see Table 1). The acyl chloride monomer (for example: TMCl) was introduced in liquid state in the previous mixture just before the emulsification process.

Water phase:

15

This phase was composed by the dissolution of a colloidal stabilizer (for example: SGA) in water or only just water.

A mixture of diamine (for example: EDA/DETA) is added to the water solution before the emulsification step.

20

Oil phase was mixed with the water phase and dispersed with an Ultra Turrax at 24,000 rpm for 30 s to afford an emulsion. The reaction mixture was stirred at 60°C for 4 h to afford a white dispersion.

Table 1: Perfume oil A formulation

Ingredient	% in oil
Ethyl 2-methyl-pentanoate	3.20%
Eucalyptol	7.80%
2,4-Dimethyl-3-cyclohexene-1-carbaldehyde	0.75%
Aldehyde C ₁₀	0.75%
Citronellyl Nitrile	4.30%
Isobornyl acetate	3.00%
2-tert-butyl-1-cyclohexyl acetate	9.80%
Citronellyl Acetate	1.30%
2-Methylundecanal	3.00%
Diphenyloxide	0.80%

Aldehyde C ₁₂	1.30%
Dicyclopentadiene acetate	9.85%
Ionone beta	3.30%
Undecalactone gamma	18.75%
Hexyl Salicylate	15.9%
Benzyl Salicylate	16.2%

Table 2: Microcapsules A to D composition

	Perfume ¹⁾ %	TMCI ²⁾ % (oil)	RNA ³⁾ % (oil)	Stabilizer ⁴⁾ (water)	Stabilizer % (water)	Amines ⁵⁾ (water)	Ratio Cl-NH ₂
A	20.6	3.5	2	SGA	1	50 EDA / 50 DETA	1
B	19.1	7.0	2	-	-	50 EDA / 50 DETA	0.5
C	21.2	3.5	2	-	-	50 EDA / 50 DETA	1
D	21.7	3.5	2	Jaguar optima	0.3	50 EDA / 50 DETA	1

5 1) See Table 1

2) Trimesoyl Chloride, Origin Alfa Aesar

3) Ribonucleic acid, Origin From yeast, Roche

4) SGA: Superstab Gum Arabic: Origin Gum Arabic, Nexira

10 Jaguar Optima: Origin Guar Hydroxypropyltrimonium Chloride, Solvay
Novecare

5) EDA: Ethylene diamine, Origin Sigma Aldrich

DETA: Diethylene triamine, Origin Sigma Aldrich

Microcapsules E: RNA and polylysine solutions were prepared and adjusted at
15 pH5. The polylysine solution was then mixed with perfume oil A at 10% and
emulsified with an Ultraturrax. RNA was then added to the mixture. Then
glutaraldehyde at 10% (with respect to polylysine) was added to the emulsion as

cross-linker and the mixture is let under mechanical stirring overnight to obtain microcapsules in the form of a slurry.

Table 3: Microcapsules E composition

	Ratio RNA/Poly Lysine	Polylysine (%water)	RNA (% water)	Total polymer content (%water)	% Perfume	Glutaraldehyde (% of Polylysine)
E	2 / 1	2	1	3	10	10

5

Microcapsules F:

Process A) A RNA solution was prepared and adjusted to pH 5. TMCI and polylysine were solubilized in perfume oil A and the resulting oil phase was emulsified in a 0.5% PVOH (polyvinyl alcohol) water solution. The pH was adjusted to 5 and then the RNA solution was added to the emulsion. Finally, glutaraldehyde was added dropwise and let under mechanical stirring overnight to obtain microcapsules in the form of a slurry.

10

Process B) A RNA and a polylysine solutions were prepared and adjusted to pH 5. TMCI was solubilized in perfume oil A and the resulting oil phase was emulsified in a 0.5% PVOH water solution. The pH was adjusted to 5 and then the polylysine and the RNA solutions were subsequently added to the emulsion. Finally, the glutaraldehyde was added dropwise and let under mechanical stirring overnight to obtain microcapsules in the form of a slurry.

15

20

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Table 4: Microcapsules F composition

C	Process	Ratio RNA/PolyLys	PolyLys	RNA (% water)	% Perfume	TMCI % (oil)	Glutaraldehyde (PolyLysine)	Emulsifier (PVOH, % in water)
F1	A	2 / 1	0.98 (water)	2	10.59	3.67	10	0.5
F2	B	2 / 1	8.34 (oil)	1.98	10.61	3.67	10	0.5

Process A) A RNA and CTAB (hexadecyltrimethylammonium bromide, Sigma

- 5 Aldrich) was prepared in water and lyophilized to obtain a powder. The powder was then introduced in perfume oil A together with Takenate® D 110N ((75%) - trimethylol propane adduct of xylene diisocyanate, trademark from: Mitsui Chemicals). The resulting oil phase was emulsified in a water solution containing gum Arabic at 1% using an ultraturrax.

- 10 Process B) Takenate® D 110N was dissolved in the oil phase which is then emulsified in a CTAB water solution with an Ultraturrax. The pH was brought to 9 by NaOH. A RNA solution was then added dropwise and let cure (4 hours at RT).

Table 5: Microcapsules G composition

C	Process	RNA/CTAB ratio	CTAB+RNA %	Takenate (% oil)	Perfume %	Emulsifier (Gum Arabic, % in water)
G1	A	1 / 1	1.98 (oil)	3.04	18.53	1
G2	A	1 / 1	1.93 (oil)	6.74	17.67	1
G3	A	1 / 1	3.72 (oil)	6.74	17.52	1

G4	B	1/2	3.00 (water)	6.90	17.89	-
G5	B	1/2	3.00 (water)	6.34	9.89	-

Example 2

Microcapsules stability

5

The microcapsules were added in a Fabric Softener base (see Table 6) and stored for 3 days at 37°C with a perfume oil dosage in the base is 0.2%.

Table 6: Fabric Softener composition

Product	Wt %
Stepantex VL 90A	8.88
Calcium Chloride Sol. 10%	0.36
Proxel GXL	0.04
Perfume	1.00
Water	89.72
TOTAL	100.00

10

Weigh 2g of sample (base with capsules) in a 20mL vial. Add to the vial 10 mL of the extraction solvent isooctane containing the internal standard 1,4-dibromobenzene at a precisely known concentration around 90 ng/uL. Shake for 45 min at 40RPM to extract the free perfume. Remove the solvent phase.

15

To measure the leakage in the base the Agilent GCFID7890A is use, the injector is set at 250°C, helium is used as the carrier gas at a flow rate of 1 mL/min, the oven temperature is programmed from 120°C, held 5 minutes, increased to 170°C at 10°C/min, increased to 220°C at 25°C/min and then increased to 260 at 25°C/min. To finish a post run is apply at 260°C to finish the measure.

Calibration solutions are prepared at 100, 300 and 600 ng/uL of fragrance oil in the isooctane. It is important that the fragrance oil used to prepare the calibration curve comes from the same batch used to produce the microcapsules.

5 **Table 7:** Stability (Perfume Leakage at 37°C – 3 days/1 month)

	Sample	Leakage % @ 3d/37°C	Leakage % @ 1m/37°C
	Microcapsules A	13	36.2
10	Microcapsules B	17	40

Example 3

15 Coacervate microcapsule preparation

Protocol A

RNA and the protein as a powder blend were dissolved in DI water and stirred @400rpm with a 4-blades impeller.

20 Polyisocyanate (Takenate® - trimethylol propane-adduct of xylylene diisocyanate (**T**)) was then dissolved in Perfume oil A (**P**) and stirred @200 RPM using a magnetic plate.

Both solutions were mixed and emulsified using Ultra Turrax 1min @11k rpm

The pH was then adjusted with NaOH 3M or glyoxylic acid 50% under stirring.

25 Glutaraldehyde 50% was added and stirred for 4h.

A sample has also been made without the trimethylol propane-adduct of xylylene diisocyanate and by adding RNA once the emulsion was formed.

30

Table 8: Microcapsule compositions and stability (Perfume Leakage at 37°C – 3 days in fabric softener (see Table 6))

S	P%	T %oil	RNA %wat.	Protein	Protein % water	Glutaraldehyde %water	pH	Leakage %
H1	22.6	3.1	1.28	Potato protein ¹⁾	2.60	0.1	3.2	9
H2	22.6	2.85	0.77	Canola ²⁾	3.1	0.1	6	8
H3	22.6	3.35	0.79	Canola	3.1	0.1	5	6
H4	19.91	0	0.49	Canola	2.42	0.25	6	NM

NM: not measured

1) Solanic200 – Origin, Avebe

5 2) CanolaPro, Origin: DSM

Protocol B

Potato protein (Solanic200 – Origin, Avebe) was dissolved in DI water and stirred @400rpm with a 4-blades impeller.

10 RNA and a polyisocyanate (Takenate® (T)) were dissolved in the oil phase (Perfume oil A (P) or perfume oil A + Neobee), then heated @60° for 30min and stirred @200 RPM using a magnetic plate.

Both solutions were mixed and emulsified using UT 1min @11k rpm.

pH was then adjusted with glyoxylic acid 50% under stirring.

15 Glutaraldehyde 50% was added and stirred for 4h.

Table 9: Microcapsule compositions and stability (Perfume Leakage at 37°C – 3 days in a fabric softener (see Table 6))

Sample	Oil %	Takenate %oil	RNA %oil	Protein % water	Glutaraldehyde %water	pH	Leakage %
I1	22.7 (P)	2.56	1.30	2.60	0.12	3.2	6

I2	18.1 (P) + 4.60 Neobee	2.49	4.39	2.60	0.11	3.2	4
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Protocol C

Potato protein (Solanic200 – Origin, Avebe) and Gum Arabic (GA), or potato protein and gum Arabic and RNA, or potato protein and RNA were dissolved as a powder blend in DI water and stirred @400rpm with a 4-blades impeller.

Polyisocyanate (Takenate® (T)), or Polyisocyanate (Takenate® (T)) and RNA, or Polyisocyanate (Takenate® (T)) and gum Arabic were dissolved in perfume oil A (P) @200 RPM using a magnetic plate

Both solutions were mixed and emulsified using UT 1min @11k rpm

pH was adjusted to 3.2 with glyoxylic acid 50% under stirring.

Glutaraldehyde 50% was added and stirred for 4h.

Table 10: Microcapsule compositions and stability (Perfume Leakage at 37°C – 3 days in fabric softener (see Table 6))

S	Oil %	T%oil	RNA %water	RNA %oil	Protein % water	Glutaraldehyde %water	GA water%	GA oil%	pH	Leakage %
J1	22.6	2.56	1.36	-	2.68	0.12	0.26	-	3.2	8
J2	22.6	2.85	1.36	-	2.68	0.11	-	3.92	3.2	8
J3	22.6	2.85	-	4.4	2.68	0.11	0.16	-	3.2	15

Example 4

Powder detergent composition

A sufficient amount of exemplified microcapsules is weighed and mixed in a powder detergent composition to add the equivalent of 0.2% perfume.

Table 11: Powder detergent composition

Ingredients	Part
Anionic (Linear Alkyl Benzene Sulphonates)	20%
Nonionics (Alcohol Ethoxylates (5-9 ethylene oxide)	6%
Builders (zeolites, sodium carbonate)	25%
Silicates	6%
Sodium Sulphate	35%
Others (Enzymes, Polymers, Bleach)	7.5%
Spray-dried granule powder A-E	0.5%

5

Example 5

Liquid detergent composition

Microcapsules of the present invention are dispersed in a liquid detergent base described below to obtain a concentration of encapsulated perfume oil at 0.22%.

10

Table 12: Liquid detergent composition

Ingredients	Concentration [wt%]
Sodium C14-17 Alkyl Sec Sulfonate ¹⁾	7
Fatty acids, C12-18 and C18-unsaturated ²⁾	7.5
C12/14 fatty alcohol polyglycol ether with 7 mol EO ³⁾	17
Triethanolamine	7.5
Propylene Glycol	11

Citric acid	6.5
Potassium Hydroxyde	9.5
Protease	0.2
Amylase	0.2
Mannanase	0.2
Acrylates/Steareth-20 Methacrylate structuring Crosspolymer ⁴⁾	6
Deionized Water	27.4

- 1) Hostapur® SAS 60; Origin: Clariant
- 2) Edenor® K 12-18; Origin: Cognis
- 3) Genapol® LA 070; Origin: Clariant
- 4) Aculyn® 88; Origin: Dow Chemical

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Example 6

Rinse-off conditioner

Microcapsules of the present invention are dispersed in a rinse-off conditioner base
10 described below to obtain a concentration of encapsulated perfume oil at 0.5%.

Table 13: Rinse-off conditioner composition

	Ingredients	Concentration [wt%]
A	Water deionized	81.8
	Behentrimonium Chloride ¹⁾	2.5
	Hydroxyethylcellulose ²⁾	1.5
B	Cetearyl Alcohol ³⁾	4
	Glyceryl Stearate (and) PEG-100 Stearate ⁴⁾	2
	Behentrimonium Methosulfate (and) Cetyl alcohol (and) Butylene Glycol ⁵⁾	4
	Ethoxy (20) Stearyl Alcohol ⁶⁾	1

C	Amodimethicone (and) Trideceth-12 (and) Cetrimonium Chloride ⁷⁾	3
	Chlorhexidine Digluconate ⁸⁾ 20% aqueous solution	0.2
D	Citric acid 10% aqueous sol. till pH 3.5-4	q.s.
	TOTAL:	100

- 1) Genamin KDM P, Clariant
- 2) Tylose H10 Y G4, Shin Etsu
- 3) Lanette O, BASF
- 4) Arlacel 165-FP-MBAL-PA-(RB), Croda
- 5) Incroquat Behenyl TMS-50-MBAL-PA-(MH) HA4112, Croda
- 6) SP Brij S20 MBAL-PA(RB), Croda
- 7) Xiameter DC MEM-0949 Emulsion, Dow Corning
- 8) Alfa Aesar

10

Example 7
Shampoo composition

Microcapsules of the present invention are weighed and mixed in a shampoo composition to add the equivalent of 0.2% perfume.

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Table 14: Shampoo composition

	Ingredients	Concentration [wt%]
A	Water deionized	44.4
	Polyquaternium-10 ¹⁾	0.3
	Glycerin 85% ²⁾	1
	DMDM Hydantoin ³⁾	0.2
B	Sodium Laureth Sulfate ⁴⁾	28
	Cocamidopropyl Betaine ⁵⁾	3.2
	Disodium Cocoamphodiacetate ⁶⁾	4

	Ethoxy (20) Stearyl Alcohol ⁶⁾	1
C	Sodium Laureth Sulfate ⁴⁾	3
	Glyceryl Laureate ⁷⁾	0.2
D	Water deionized	1
	Sodium Methylparaben ⁸⁾	0.1
E	Sodium Chloride 10% aqueous sol.	15
	Citric acid 10% aqueous sol. till pH 5.5-6	q.s.
	Perfume	0.5
	TOTAL:	100

- 1) Ucare Polymer JR-400, Noveon
- 2) Schweizerhall
- 3) Glydant, Lonza
- 4) Texapon NSO IS, Cognis
- 5) Tego Betain F 50, Evonik
- 6) Amphotensid GB 2009, Zschimmer & Schwarz
- 7) Monomuls 90 L-12, Gruenau
- 8) Nipagin Monosodium, NIPA

Example 8

Antiperspirant roll-on emulsion composition

- 5 Microcapsules of the present invention are weighed and mixed in antiperspirant roll-on emulsion composition to add the equivalent of 0.2% perfume.

Table 15: Antiperspirant roll-on emulsion composition

Ingredient	Amount (wt %)
Steareth-2 ¹⁾ (Part A)	3.25
Steareth-21 ²⁾ (Part A)	0.75
PPG-15 Stearyl Ether ³⁾ (Part A)	4

WATER deionised (Part B)	51
Aluminum Chlorohydrate 50% aqueous solution ⁴⁾ (Part C)	40
Fragrance (Part D)	1

- 1) BRIJ 72; origin : ICI
- 2) BRIJ 721; origin : ICI
- 3) ARLAMOL E; origin : UNIQEMA-CRODA
- 4) LOCRON L; origin : CLARIAN

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Part A and B are heated separately to 75°C; Part A is added to Part B under stirring and the mixture is homogenized for 10 min. Then, the mixture is cooled under stirring; and Part C is slowly added when the mixture reached 45°C and Part D when the mixture reached at 35 °C while stirring. Then the mixture is cooled to room temperature.

10

Example 9

Deodorant spray composition

- 15 Microcapsules of the present invention are weighed and mixed in antiperspirant roll-on emulsion composition to add the equivalent of 0.2% perfume.

Table 16: Deodorant spray composition

Ingredient	Amount (wt %)
Ethanol 95 %	90.65
Triclosan ¹⁾	0.26
Isopropyl miristate	9.09

- 1) Irgasan® DP 300; trademark and origin : BASF

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All the ingredients according to the sequence of Table 11 are mixed and dissolved. Then the aerosol cans are filled, crimp and the propellant is added (Aerosol filling: 40% active solution 60% Propane / Butane 2.5 bar).

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Example 10

Shower-gel composition

Microcapsules of the present invention are weighed and mixed in the following
5 composition to add the equivalent of 0.2% perfume.

Table 17: Shower gel composition

Ingredients	Amount (% wt)	Function
WATER deionized	49.350	Solvent
Tetrasodium EDTA ¹⁾	0.050	Chelating agent
Acrylates Copolymer ²⁾	6.000	Thickener
Sodium C12-C15 Pareth Sulfate ³⁾	35.000	Surfactant
Sodium Hydroxide 20% aqueous solution	1.000	pH adjuster
Cocamidopropyl Betaine ⁴⁾	8.000	Surfactant
Methylchloroisothiazolinone and Methylisothiazolinone ⁵⁾	0.100	Preservative
Citric Acid (40%)	0.500	pH adjuster

- 1) EDETA B POWDER; trademark and origin: BASF
2) CARBOPOL AQUA SF-1 POLYMER; trademark and origin: NOVEON
10 3) ZETESOL AO 328 U; trademark and origin: ZSCHIMMER & SCHWARZ
4) TEGO-BETAIN F 50; trademark and origin: GOLDSCHMIDT
5) KATHON CG; trademark and origin: ROHM & HASS

Example 11

15 Unit dose formulation

A sufficient amount of exemplified microcapsules is weighed and mixed in a unit dose
formulation to add the equivalent of 0.2% perfume.

The unit dose formulation can be contained in a PVOH (polyvinyl alcohol) film.
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Table 18: Unit dose composition

Ingredients	Concentration [wt%]
C12 - C14 alkyl poly ethoxylate	15

C12 - C14 alkyl poly ethoxylate sulfate Mono Ethanol Amine salt	9.5
Linear Alkylbenzene sulfonic acid	17
Citric Acid	0.5
C12 - C18 Fatty Acid	17
Enzymes	1.2
Fluorescent brightener	0.3
1,2 propanediol	12
Glycerol	9
Sodium Hydroxide	1
Mono Ethanol Amine	6
PDMS	2.5
Potassium sulphite	0.2
water	8.8
Total	100

Example 12

Soap bar

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A sufficient amount of exemplified microcapsules is weighed and mixed in a soap bar formulation a concentration of 7.5% w/w.

Table 19: composition of soap formulation

Ingredients	Soap Formulation (%)
Surfactants	
Sodium Linear Alkyl Benzene Sulfonate	
Soap	10 to 25

Alpha Olefin Sulfonate (AOS)	
sodium lauryl sulfate	
Builders	
Sodium Carbonate	5 to 15
Sodium Tri Polyphosphate	
Zeolite	
Fillers	
Sodium Sulphate	5 to 30
Talc	5 to 30
Dolomite	5 to 50
China Clay	5 to 50
Calcite - Calcium Carbonate	
Sodium Chloride	5 to 20
Structuring Ingredients	
Aluminium Sulphate	0.5 to 5
Alkaline Silicate	1 to 5
Others	
Colour	0.1 to 1
Perfume A	0.1 to 1
Moisture	5 to 15

Example 13

Cosmetic day cream

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A sufficient amount of exemplified microcapsules is weighed and mixed into a cosmetic skin cream (see composition below) at a concentration of 5%w/w.

Table 20: Cream composition

Phase	Ingredients	Amounts (%)
A	Ethoxylated Fatty Alcohol Ester ¹⁾	5
	Cetyl alcohol	0.5

	Ceteth-20 (and) Glyceryl Stearate (and) PEG-6 Stearate (and) Steareth-20 ²⁾	4
	Squalan ³⁾	1
	Paraffin oil	2
	Petrolatum	6
B	Water	55.85%
	Hydrated coacervate phase	20
C	Propylene glycol	5
	DMDM Hydantoin (and) Iodopropynyl Butylcarbamate ⁴⁾	0.15
D	Sodium Carbomer	0.2
E	Perfume	0.3

1) ARLATONE 985

2) TEFOSE 2561

3) COSBIOL

5 4) GLYDANT PLUS

Example 14

Toothpaste formulation

- 10 A sufficient amount of a microcapsule slurry M (prepared according to the protocol disclosed in example 1 except that a menthol flavor is encapsulated) is weighed and mixed in the following composition to add the equivalent of 0.2% flavor.

Table 21: Toothpaste formulation

Ingredients	Amount (% wt)
Polyethylene glycol 400	2.0%
Xanthan Gum	0.6%

Sorbitol 70% Solution	50%
Sodium Fluoride	0.220%
Sodium Benzoate	0.2%
Water	15.230%
Hydrated Silica ¹⁾	22.0%
Hydrated Silica ²⁾	7.0%
Titanium Dioxide CI77891	0.5%
Sodium Lauryl Sulfate	1.250%
Flavor	1.2%
TOTAL	100%

1) Tixosil 73; trademark and origin :

2) Tixosil 43; trademark and origin :

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CLAIMS

- 1- A delivery system comprising a hydrophobic material and a carrier, wherein
5 the carrier comprises ribonucleic acid (RNA).
- 2- The delivery system according to claim 1, wherein it is a core-shell
microcapsule, wherein the carrier is a shell and wherein the core comprises
the hydrophobic material.
- 10 3- The delivery system according to anyone of the preceding claims, wherein the
carrier comprises a polymeric material, preferably chosen in the group
consisting of polyurea, polyurethane, polyamide, polyester,
polyhydroxyalkanoates, polyaminoesters, polyepoxides, polyacrylate,
15 polysiloxane, polycarbonate, polysulfonamide, poly (beta aminoester),
polylactic acid, poly (thiol-acrylate), polymers of urea and formaldehyde,
melamine and formaldehyde, melamine and urea, or melamine and glyoxal,
gelatin/ gum arabic shell wall and mixtures thereof.
- 20 4- The delivery system according to anyone of the preceding claims, wherein the
carrier comprises an amino compound.
- 5- The delivery system according to claim 4, wherein the amino compound is
chosen in the group consisting of polylysine, chitosan, peptide, amino-acid,
25 guar gum, protein, and mixtures thereof.
- 6- The delivery system according to claim 5, wherein the amino compound is a
plant protein, preferably chosen in the group consisting of soy protein, rice
protein, whey protein, potato protein, chickpea protein, pea protein, algae
30 protein, faba bean protein, barley protein, oat protein, wheat gluten protein,
lupin protein, and mixtures thereof.
- 7- The delivery system according to anyone of the preceding claims, wherein the
carrier is cross-linked.

- 8- The delivery system according to anyone of the preceding claims, wherein the carrier is cross-linked with UV radiation, glutaraldehyde, glyoxal, formaldehyde, polyanhydrides, genipin, transglutaminase and mixtures thereof.
- 9- The delivery system according to anyone of the preceding claims, wherein the hydrophobic material comprises a perfume.
- 10- Process for preparing a delivery system, comprising the following steps:
- Dispersing an oil phase comprising a hydrophobic material into a dispersing phase to obtain a two-phases dispersion,
 - Performing a curing step to obtain a delivery system, wherein ribonucleic acid (RNA) is added in the oil phase and/or in the dispersing phase and/or in the two-phases dispersion.
- 11- The process according to claim 10, wherein an amino compound is added in the dispersing phase and/or the oil phase.
- 12- The process according to claim 10 or 11, wherein a stabilizer, preferably chosen in the group consisting of inorganic particles, polysaccharides, proteins, glycoproteins, and mixtures thereof is added in the dispersing phase and/or the oil phase.
- 13- The process according to anyone of claim 10 to 12, wherein a reactant chosen in the group consisting in alcohols, amines, phenols, thiols is added in the dispersing phase and/or the water phase.
- 14- The process according to anyone of claim 10 to 13, wherein the ribonucleic acid (RNA) is added in the oil phase.
- 15- Consumer product comprising the delivery systems as disclosed in anyone of claims 1 to 9.