A novel aqueous dispersion including a plurality of microcapsules and which contains high fragrance loadings. The dispersion is suitable for inclusion into non-edible consumer goods products, laundry products, personal care products and cosmetic products. The dispersion can be obtained in an economic and efficient manner by polymerizing an emulsion so that emulsion droplets are finally encapsulated into polymeric shells.
DESCRIPTION

MICROCAPSULES

5 Technical Field
The present disclosure discloses an aqueous dispersion including microcapsules which comprise a perfume composition enclosed within a polymeric shell, a process for the manufacture of that dispersion as well as non-ingestible consumer products (such as household cleaners, laundry products, personal care products and cosmetic products) containing that dispersion.

Background Art
Microencapsulation represents a common solution to protect (e.g. upon storage) and control the delivery of hydrophobic materials such as fragrances. Microencapsulation of fragrances through free radical polymerization entails the preliminary formation of an emulsion wherein a continuous, typically aqueous-based, phase disperses an internal, hydrophobic phase containing the fragrances. By triggering polymerization within the emulsion, an aqueous dispersion of microcapsules is typically obtained wherein the microcapsules include the fragrances enclosed within a polymeric shell. The dispersion may then be incorporated into a final product such as a non-edible consumer goods product, a laundry product, a personal care product or a cosmetic product.

Summary of Invention
Technical Problem
25 Existing microencapsulation techniques are not always satisfactory when targeting effective encapsulation of high amounts of fragrances at affordable process costs. In effect, attempts to encapsulate high fragrance loadings with common and cost affordable techniques may fail or ultimately lead to aqueous dispersions of unsatisfactory quality.

30 The present disclosure provides an aqueous dispersion suitable for inclusion into non-edible consumer goods products, laundry products, personal care products and cosmetic products. The present disclosure also provides the aqueous dispersion which can be obtained in an economic and efficient manner by polymerizing an emulsion so that emulsion droplets are finally encapsulated into polymeric shells.
Solution to Problem
The present disclosure discloses an aqueous dispersion of fragrance-containing, polymeric microcapsules. The dispersions presently disclosed contain high fragrance loadings while maintaining an appropriate ease of processing. Also, an optimal delivery of fragrances is achieved as the microcapsules included in the dispersion may show advantageous stability properties such as reduced fragrance leakage for example upon storage and especially upon storage in a liquid medium. The microcapsules may also display pH-independent shell properties. This means for example that the microcapsules may display satisfactory shell stability in acid (e.g. from pH 2) and alkaline (e.g. up to pH 12) conditions as can be found in many liquid household, laundry personal care and cosmetic products, such as fabric conditioners and antiperspirants (acidic pH) or liquid laundry detergents and hard surface cleaners (alkaline pH). The instant disclosure also discloses a simple and effective polymerization process for the manufacture of an aqueous dispersion of fragrance-containing microcapsules. The instant disclosure also discloses a non-edible consumer goods product, a laundry product, a personal care product or a cosmetic product containing an aqueous dispersion of microcapsule as presently defined. In particular, the present disclosure discloses the following points:

1. An aqueous dispersion including a plurality of microcapsules, each microcapsule comprising a perfume composition enclosed within a polymeric shell, wherein
   - the perfume composition includes a fragrance,
   - the polymeric shell includes solid colloidal particles having an average primary particle size comprised between 5nm (nanometer) and 1μm (micrometer),
   - the polymeric shell further includes in polymerized form a monomer blend including:
     i) between 30% and 80% by weight over the combined weight of compounds (I) to (II) in the monomer blend of a compound (I) which is a monoethylenically unsaturated monomer and/or dimethylidiallyl ammonium chloride (DMDAAC),
     ii) between 20% and 70% by weight over the combined weight of compounds (I) to (II) in the monomer blend of a compound (II) which is a polyethylenically unsaturated monomer,
   and wherein the fragrance represents between 20% and 45% by weight over the weight of the aqueous dispersion.

2. An aqueous dispersion including a plurality of microcapsules, each microcapsule
comprising a perfume composition enclosed within a polymeric shell, wherein
- the perfume composition includes a fragrance,
- the polymeric shell includes solid colloidal particles having an average primary particle size comprised between 5nm (nanometer) and 1µm (micrometer),
- the polymeric shell further includes in polymerized form a monomer blend including:
  i) between 30% and 80% by weight over the combined weight of compounds (I) to (II) in the monomer blend of a compound (I) which is a monoethylenically unsaturated monomer and/or dimethyl diallyl ammonium chloride (DMDAAC),
  ii) between 20% and 70% by weight over the combined weight of compounds (I) to (II) in the monomer blend of a compound (II) which is a polyethylenically unsaturated monomer,
wherein a monomer (I) having water solubility at 20°C greater than 20g/100ml is contained as the compound (I) and a monomer (II) having water solubility at 20°C greater than 20g/100ml is contained as the compound (II), and the monomer blend includes more than 15% by weight and less than 60% by weight over the weight of the monomer blend of the monomers (I) and (II), and
wherein the fragrance represents between 20% and 45% by weight over the weight of the aqueous dispersion.

3. An aqueous dispersion including a plurality of microcapsules, each microcapsule comprising a perfume composition enclosed within a polymeric shell, wherein
- the perfume composition includes a fragrance,
- the polymeric shell includes solid colloidal particles having an average primary particle size comprised between 5nm and 1µm,
- the polymeric shell further includes in polymerized form a monomer blend including:
  i) between 30% and 80% by weight over the combined weight of compounds (I) to (II) in the monomer blend of a compound (I) which is a monoethylenically unsaturated monomer and/or dimethyl diallyl ammonium chloride (DMDAAC),
  ii) between 20% and 70% by weight over the combined weight of compounds (I) to (II) in the monomer blend of a compound (II) which is a polyethylenically unsaturated monomer selected from the group consisting of a C₂⁻C₄ alkyl di- or polyester of (meth)acrylic acid, a C₂⁻C₂₄ alkyl di- or polyamide of (meth)acrylic acid and mixtures thereof, and which:
    A1. contains two or more (meth)acrylate ester groups or two or more (meth)acrylate amide groups per monomer, and
1. has a molecular weight which, once divided by the number of (meth)acrylate ester or amide groups, gives a value of more than 85 and lower than 135; and

wherein the fragrance represents between 20% and 45% by weight over the weight of the aqueous dispersion.

4. The dispersion according to any one of points 1 to 3, wherein the fragrance represents between 30% and 45% by weight over the weight of the aqueous dispersion.

5. The dispersion according to any one of points 1 to 4, wherein the compound (I) is selected from (meth)acylate monomers which are polymerizable through free-radical polymerization.

6. The dispersion according to any one of points 1 to 5, wherein the compound (I) is selected from the group consisting of methacrylic acid, methyl methacrylate, ethyl methacrylate, isopropyl methacrylate, 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, 3-hydroxypropyl methacrylate and mixtures thereof.

7. The dispersion according to any one of points 1 to 5, wherein the compound (I) is a combination of:

   ia) between 50% and 100% by weight over the weight of the combination of a neutral monomethacrylate monomer (la) having a solubility in water at pH 7 and 20°C equal to, or more of 2g/1.00ml,

   ib) between 0% and 50% by weight over the weight of the combination of another neutral monoethylenically unsaturated monomer (lb), and

   ic) between 0% and 15% by weight over the weight of the combination of a ionized or ionizable monoethylenically unsaturated monomer (lc).

8. The dispersion according to point 7, wherein the neutral monomethacrylate monomer (la) is selected from the group consisting of 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, 3-hydroxypropyl methacrylate, glycidyl methacrylate, poly(ethylene glycol) methyl ether methacrylate and mixtures thereof.

9. The dispersion according to any one of points 1 to 8, wherein the compound (II) is a di- or polyester resulting from the esterification of (meth)acrylic acid with a linear or
branched polyhydric C$_2$-C$_{24}$ alcohol and/or C$_2$-C$_{24}$ polyethylene glycols.

10. The dispersion according to point 9, wherein the compound (II) comprises one or more of 1,4-butylene glycol dimethacrylate, ethylene glycol dimethacrylate and 1,3-propylene glycol dimethacrylate.

11. A product comprising dispersion as defined in any one of points 1 to 10, and which is a non-edible consumer goods product, a household cleaner or laundry product, a personal care product or a cosmetic product.

12. A process for the manufacture of the aqueous dispersion as defined in any one of points 1 to 10, said process comprising the following steps:
   a) providing an oil-in-water emulsion having an oil phase and a water phase, said emulsion being obtainable by mixing:
      o colloidal particles having an average primary particle size comprised between 5nm and 1µm,
      o a polymerization initiator,
      o a perfume composition including a fragrance,
      o an emulsifier, and
      o the monomer blend as defined in any one of points 1 to 10,
   b) triggering polymerization within the oil-in-water emulsion obtained in step a),
   c) letting the polymerization propagate thereby obtaining microcapsules;
wherein the fragrance represents between 20% and 70%, for example between 20 and 45% by weight of the weight of the oil-in-water emulsion.

13. Use of solid colloidal particles having an average primary particle size comprised between 5nm and 1µm to microencapsulate an oil-in-water emulsion, wherein the oil-in-water emulsion contains a fragrance in an amount comprised between 20% and 70% by weight of the weight of the oil-in-water emulsion.

Advantageous Effects of Invention
The aqueous dispersion is suitable for inclusion into non-edible consumer goods products, laundry products, personal care products and cosmetic products. The aqueous dispersion can be obtained in an economic and efficient manner by polymerizing an emulsion so that emulsion droplets are finally encapsulated into polymeric shells.
Description of Embodiments

Unless otherwise stated, all percentages are weight percentages.

5 Unless otherwise indicated "an" or "a" means one or more.


Unless otherwise indicated, the language "blend", "a blend" or "monomer blend" refers to the blend including compounds (I) to (II).

15 Unless otherwise indicated, "monomer" means monomers which can be polymerized by free radical polymerization.

20 Unless otherwise indicated "(meth)acrylate" (or "(meth)acrylic") means methacrylate (or methacrylic) and/or acrylate (or acrylic). For example, it means methacrylate (or methacrylic). For example it means acrylate (or acrylic). For example it means methacrylate (or methacrylic) and acrylate (or acrylic).

25 Unless otherwise indicated, methacrylate and acrylate ester groups are groups having molecular weight of 85 and 71 mass units, respectively, and the following structures

\[
\begin{align*}
A & \\
\text{H}_2\text{C} & \\
\text{O} & \\
\end{align*}
\]

wherein A is \(\text{CH}_3\) for a methacrylate ester group or A is H for an acrylate ester group.

30 Unless otherwise indicated, methacrylate or acrylate amide groups are groups having molecular weight of 84 and 70 mass units, respectively, and the following structures
wherein B is CH$_3$ for a methacrylate amide group or B is H for an acrylate amide group.

Unless otherwise indicated, room temperature is 20°C.

Certain substances, notably perfumery molecules, may exist as distinct isomers (or as mixture of distinct isomers). Hereinafter, they may be identified also by means of their CAS number. In these cases, the CAS number of a single isomer is reported. However, and unless otherwise indicated, the reference shall be understood to cover all existing isomers.

The present disclosure discloses an aqueous dispersion including a plurality of microcapsules, each microcapsule including, such as consisting of, a perfume composition enclosed within a polymeric shell. Terms such as "slurry" or "slurry dispersion" may also be used hereinafter to refer to the dispersion.

The dispersion may comprise, for example essentially consist of, a water-based liquid medium (i.e. the dispersing medium) and a plurality of solid microcapsules dispersed in the medium. Traces of other ingredients used in the manufacturing process (such as polymerization initiators and residual, unreacted monomers) may also be present.

In the dispersion, the fragrance typically represents between 20% and 45%, such as more than 25%, for example more than 30% or more than 33% and less than 40%, for example less than 35% by weight of the weight of the dispersion.

The water-based liquid medium may include water, such as deionized water.

The dispersion may be the product directly obtainable by a free radical polymerization process as defined below.

The dispersion may conveniently be used to prepare e.g. liquid products that will be discussed later in this disclosure. The slurry functions thus as a concentrated fluid which is added to the liquid products.

The slurry can also conveniently be used as a storage medium for the microcapsules of the invention. In case no water (or a limited amount of water) must be present in the final product, the slurry can be preliminary subjected to a spray-drying step and the spray-dried product is then added to the final intended product.

Methods of preparation of perfume-containing microcapsules are described for example in MICROENCAPSULATION: Methods and Industrial Applications Edited by Benita and Simon (Marcel Dekker, Inc. 1996) and in Kirk Othmer Encyclopedia of Chemical Technology Microencapsulation by C. Thies. Microcapsules obtainable by free radical polymerization are well known to those working in the field of e.g. encapsulated perfumes and are structurally (and dimensionally) different from other types of capsules such as conventional seamless soft capsules or two-piece hard capsules used e.g. in pharmacy to orally or rectally administrate substances to a subject.

The microcapsules presently disclosed are not intended for oral or rectal administration to human or animal subjects.

A microcapsule as presently disclosed may have a shell thickness comprised between about 100nm and 800nm, such as between about 200nm and 700nm, for example between about 300nm and 600nm.

The microcapsules as presently disclosed may have a perfume composition-to-shell weight ratio which is comprised between 50:1 and 1:1, such as between 30:1 and 1:1, or between 20:1 and 1:1, for example between 10:1 and 1:1.

The microcapsules presently disclosed may be substantially spherical.

The microcapsules presently disclosed may have an average particle size (median volume particle size D(\nu; 0.5) value) equal to or greater than 7.5 microns (7.5\mu\eta\eta\eta), for example equal to or greater than 10\mu\eta\eta\eta, such as equal to or greater than 15\mu\eta\eta\eta, or equal to or greater than 20\mu\eta\eta\eta, for example equal to or greater than 25\mu\eta\eta\eta. The microcapsule
presently disclosed may have an average particle size equal to or less than 60 microns (60 µm), for example equal to or less than 50 µm, such as equal to or less than 45 µm, for example equal to or less than 40 µm. The microcapsule presently disclosed may have an average particle size comprised between 7.5 microns (7.5 µm) and 60 microns (βθμιτι), or between 7.5 µm and 50 µm, or between 10 µm and 50 µm, or between 7.5 µm and 45 µm, or between 10 µm and 45 µm, or between 15 µm and 45 µm, or between 15 µm and 40 µm, or between 20 µm and 45 µm, or between 25 µm and 45 µm, or between 25 µm and 40 µm, or between 25 µm and 35 µm.

Microcapsules obtainable by free-radical polymerization have typically quite small (e.g. less than about 7 microns) average particle sizes. This might be due to a technical belief that this size better copes with an efficient polymerization, thus leading to capsules with better properties. At the same time, it was also believed that average particle size did not have a significant impact on final capsule leakage. The experimental results obtained by the present Applicant showed however that no significant issues with polymerization are met when targeting larger sizes and that larger average particle sizes may bring about an advantage in terms of leakage. If microcapsules with dimensions which do not make them visible at naked eye when deposited on a black surface are desired, then it is recommendable to target an average particle size of less than e.g. 70 microns.

The preferred technique used in the present disclosure to measure the microcapsule average particle size is light scattering using for example a Horiba® or a Malvern® Laser scattering particle Size Distribution analyzer or an equivalent instrument working on the principle of low angle laser light scattering (LALLS) following the general guidelines set out in ISO 13320 "Particle Size Analysis - Laser Diffraction Methods".

The microcapsule polymeric shell comprises solid colloidal particles (also known as particulate colloids) having an average primary particle size comprised between 5 nm and 1 pm as measured for example through dynamic light scattering. Free radical polymerization for microcapsule preparation generally includes the initial formation of an oil-in-water emulsion. Particulate colloids allow obtaining Pickering oil-in-water emulsions stabilized by limited coalescence. The process of formation of Pickering emulsions is known. It is discussed for example in Whitesides and Ross, J. Interface Colloid Sci. 196, 48-59(1995).
Examples of materials which can be suitably used in the form of solid colloidal particles in the microcapsules presently disclosed are silica, quartz, glass, aluminum (Al(OH)), aluminosilicates (e.g. clays), silicon, copper, tin (SnO), talc, inorganic oxides or hydroxides (e.g. Fe₂O₃, TiO₂, Cr₂O₃), steel, iron, asbestos, nickel, zinc, lead, marble, chalk (CaCO₃), gypsum (CaSO₄), barytes (e.g. BaSO₄), graphite and carbon black. Preferred materials are silica, aluminosilicates and inorganic oxides or hydroxides. Silica is a highly preferred material.

Solid colloidal particles suitable for the present disclosure may or may not be surface modified. Surface modification may either impart the ability to materials to partition to the interface of water and oil phases or it may improve the compatibility between the materials and the microcapsule polymeric shell. Examples of surface modification include chemical treatments to increase or decrease particles hydrophobicity. Alternatively, surface modifying agents can be adsorbed onto particles surface to impart appropriate surface active properties. Alternatively, particles may be modified by means of coupling agents which improve the compatibility between the materials and the microcapsule polymeric shell. Techniques to modify particle surfaces are discussed for example in "Nanoparticle Technology handbook" 1st edition, year 2007, Application 41 (pages 593-596) "Surface modification of inorganic nanoparticles by organic functional groups". Modified (as well as non-modified) solid colloidal particles are commercially available.

Examples of suitable colloidal silicas may be dry fumed silicas (such as commercially available in the Aerosil® range from Evonik®) or aqueous colloidal silica dispersions (such as those commercially available in the Ludox® range from Du Pont®). Dry silica particles may be fumed silica particles or condensed silica particles. Fumed silicas are particularly adapted for stabilizing emulsions with droplet sizes in the range of 10µm to 100µm. For larger droplets, colloidal silicas might be more appropriate. Suitable grades of fumed silica are Aerosil® 200 (a hydrophilic fumed silica with a specific surface area of 200 m²/g) and Aerosil® R816 having a BET surface area of 190 ± 20 m²/g and an average primary particle size of about 12 nm, both available from Evonik®.

Amounts of solid colloidal particles may be comprised between 0.005% and 10%, such as between 0.01% and 5%, for example between 0.02% and 3%, such as between 0.05% and 2%, or between 0.1% and 1%, such as 0.25% by weight over the weight of the plurality of microcapsules.
The use of solid colloidal particles as presently defined has been found to permit a satisfactory and effective microencapsulation of desirably high fragrance loadings while maintaining a suitable quality of the resulting dispersion (e.g. handling quality, permitting a good processability of the dispersion). This allows encapsulating more fragrance than usual while not being confronted with insurmountable manufacturing hurdles or having to tolerate a non-ideal dispersion quality. These results are achievable without relying on complex and expensive manufacturing techniques such as high shearing during the entire process, especially during polymerization.

Although it is not intended to be bound by any theory, advantages of the claimed use may be experimentally confirmed by primarily noting that viscosity values measured in the instant aqueous dispersions are generally improved with respect to the corresponding values as measured in identical measuring conditions, in identical aqueous dispersions obtainable in identical conditions but without solid colloidal particles. Improvements in term of viscosity are also generally mirrored by corresponding improvements in terms of span ratio. The Span ratio and/or viscosity may thus be valuable tools to evaluate the aqueous dispersion quality. In effect, they reflect the amount of (unwanted) generally very small latex particles that form in the water phase during polymerization while also providing an indication of microcapsule size uniformity and microcapsule amount in the dispersion.

Identical conditions are preferably identical qualitative and quantitative conditions such as identical fragrance loading and fragrance chemical nature, identical monomer blend, identical process conditions and identical process ingredients.

Compound (I) is preferably a monoethylenically unsaturated monomer.

Examples of suitable monoethylenically unsaturated monomer polymerizable by a free radical polymerization are:

- alpha-olefins;
- dienes such as butadiene;
- styrene, alpha-methyl styrene, sodium 4-styrene sulfonate;
- vinyl ethers, such as ethyl vinyl ether, chloroethyl vinyl ether, vinyltrimethylsilane;
- vinyl ketones, such as methyl vinyl ketone;
- vinyl naphthalene;
- 4-vinylbenzoic acid;
- allyl and vinyl chloroacetate;
- vinyl halides and vinylidene halides, for example, vinyl bromide, vinylidene chloride
- vinyl acetate;
- 2-vinyl pyridine and 4-vinyl pyridine;
- N-vinylpyrrolidone;
- acrylic acids and derivatives for example, acrylic acid, methacrylic acid, crotonic acid;
- itaconic acid and itaconate esters such as dibutyl itaconate;
- esters of acrylic acid, such as methyl acrylate, ethyl acrylate, propyl acrylate, butyl acrylate, isopropyl acrylate, tert-butyl acrylate, isobutyl acrylate, n-butyl acrylate, tetrahydrofurfuryl acrylate, octyl acrylate, octadecyl acrylate, isoctyl acrylate, isobutyl acrylate, isobornyl acrylate, lauryl acrylate, cyanoethyl acrylate, 2-hydroxyethyl acrylate, 2-ethylhexyl acrylate, 2-[[butylamino]carbonyl]oxy]ethyl acrylate, acryloxyethyltrimethyl ammonium chloride, 3-Sulfopropyl acrylate potassium salt, poly(propylene glycol) acrylate, poly(ethylene glycol) diacrylate;
- esters of methacrylic acid, such as methyl methacrylate, ethyl methacrylate, propyl methacrylate, butyl methacrylate, isopropyl methacrylate, tert-butyl methacrylate, isobutyl methacrylate, n-butyl methacrylate, benzyl methacrylate, isobornyl methacrylate, cyclohexyl methacrylate, tetrahydrofurfuryl methacrylate, mono(ethylene glycol) methyl ether methacrylate, di(ethylene glycol) methyl ether methacrylate, 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, 3-hydroxypropyl methacrylate, glycidyl methacrylate, triethylene glycol methyl ether methacrylate, poly(ethylene glycol) methyl ether methacrylate, 2-(diethylamino)ethyl methacrylate, dimethylaminoethyl methacrylate, 2-(tert-butylamino)ethyl methacrylate, 2-ethyl(2-oxoimidazolidin-1-yl)methacrylate, methacryloxyethyltrimethyl ammonium chloride, metacryloxypropyltrimethoxysilane, metacryloxypropyltriethoxysilane;
- nitriles, such as acrylonitrile, methacrylonitrile;
- acrylamides and methacrylamides, such as methyl acrylamide, 4-Acryloylmorpholine, N-methylol acrylamide, 2-acrylamido-2-methylpropane sulfonic acid, N-butoxy methacrylamide, N-(3-dimethylaminopropyl methylacrylamide, dimethylaminopropyl methacrylamide, 3-trimethylammonium propyl methacrylamide chloride;
- alkyl crotonates, and related esters such as methyl crotonate;
- cyclic and polycyclic olefin compounds for example, cyclopentene, cyclohexene, cycloheptene, cyclooctene, and cyclic derivatives up to 20 carbon atoms; polycyclic
derivates for example, norbornene, and similar derivates up to 20 carbon atoms;
- cyclic vinyl ethers for example, 2,3-dihydrofuran, 3,4-dihydroxyran, and similar derivates;
- allylic alcohol derivates for example, vinylethylene carbonate; and
- disubstituted olefins such as maleic and fumaric compounds for example, maleic anhydride, diethylfumarate.

In particular, suitable examples of compound (I) are:

a) $C_3^-C_6^+$ monoethylenically unsatured mono- or poly carboxylic acids,

b) amides of $C_3^-C_6^+$ monoethylenically unsatured mono- or poly carboxylic acids;

c) optionally mono- or polysubstituted $C_1^-C_4^+$ linear or branched alkyl esters of $C_3^-C_6^+$

- monoethylenically unsatured mono- or poly carboxylic acids,

- and

d) optionally mono- or polysubstituted $C_3^-C_6^+$ cycloalkyl esters of $C_3^-C_6^+$

- monoethylenically unsatured mono- or poly carboxylic acids,

wherein optional substituents are selected from the group consisting of -OH, -OR, -C(0)R, 
-NH$_2$, -NHR, -NR$_2$, -NR$_3^+$, -C$_5^-C_6^+$ aromatic or heteroaromatic rings, and $C_3^-C_{10}$ cyclo- or 
heterocyclic alkyl,

wherein R is $C_1^-C_4^+$ alkyl. The carboxylic acid is preferably a monocarboxylic acid such as 

methacrylic acid.

For example, compound (I) is selected from acrylic acid, methacrylic acid, maleic acid, 
itaconic acid, 2-(diethylamo)ethyl methacrylate, dimethylaminoethyl methacrylate, 2-
(tert-butylamino)ethyl methacrylate, N-[3-(dimethylamino)propyl]methacrylamide, 3-
trimethylammonium propyl methacrylamide chloride, methyl methacrylate, ethyl 

methacrylate, n-propyl methacrylate, isopropyl methacrylate, tert-butyl methacrylate, 
isobutyl methacrylate, n-butyl methacrylate, methacrylamide, benzyl methacrylate, 
isobornyl methacrylate, cyclohexyl methacrylate, tetrahydrofuryl methacrylate, glcidyl 
methacrylate, 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, 3-
hydroxypropyl methacrylate, poly(ethylene glycol) methyl ether methacrylate, 2-ethyl(2-
oximidazolidin-1-yl) methacrylate, acryloxyethyltrimethyl ammonium chloride, 
methacryloxyethyltrimethyl ammonium chloride and mixtures thereof.

Compound (I) may be selected from methacrylic acid, methyl methacrylate, ethyl 
methacrylate, isopropyl methacrylate, 2-hydroxyethyl methacrylate, 2- or 3-hydroxypropyl
methacrylate and mixtures thereof, for example methacrylic acid, methyl methacrylate, ethyl methacrylate and mixtures thereof.

Compound (I) may be a combination of methacrylic acid and methyl and/or ethyl methacrylate. The combination may be used in an amount comprised between 30% and 60%, for example between 35% and 60% by weight over the combined weight of compounds (I) to (II) in the blend. In the combination, methacrylic acid may be present between 35% and 50%, such as between 45 and 47%, by weight, and methyl or ethyl methacrylate between 0% and 15%, such as between 0 and 8%, by weight over the combined weight of compounds (I) to (II) in the blend.

Advantageously, compound (I) is a monomethacrylate unsaturated monomer meaning that it contains one single methacrylate ester group. In effect, methacrylates proved to be less susceptible than acrylates to hydrolysis on prolonged exposure to acidic or alkaline pH and elevated storage temperatures. Hence, it may be advantageous that compound (I) does not contain acrylic acid derivatives such as C₁⁻⁻⁻⁻⁴ alkyl or C₃⁻⁻⁻⁻⁶ cycloalkyl esters or amides of acrylic acid.

In one embodiment, the monomer blend includes for example between 30% and 60%, for example between 35% and 60% by weight over the combined weight of compounds (I) and (II) in the blend of a compound (I) which is a combination of:

ia) between 50% and 100%, such as between 60% and 100%, for example between 70% and 100% by weight over the weight of the combination of a neutral monomethacrylate monomer (Ia) having a solubility in water at 20°C equal to, or more than 2g/100ml,

ib) between 0% and 50%, such as between 0% and 40%, for example between 0% and 30% by weight over the weight of the combination of another neutral monoethylenically unsaturated monomer (Ib), and

ic) between 0% and 15%, such as between 0% and 5% by weight over the weight of the combination of a ionized or ionizable monoethylenically unsaturated monomer (Ic).

Adopting the above combination of monomers (Ia) to (Ic) allows obtaining microcapsules which display shell properties which are pH-independent in a pH range commonly met in liquid household, laundry personal care and cosmetic products, such as fabric conditioners and antiperspirants (acidic pH) or liquid laundry detergents and hard surface
cleaners (alkaline pH). For example, this pH range is comprised between 2 and 12, such as more than 4, for example between 4 and 12. Hence, it is particularly advantageous that a product (as defined below) including a microcapsule obtainable with that blend is liquid at room temperature and has a pH of, for example, more than 4, such as more than 4 and less than 12.

In the present description and unless otherwise indicated, "neutral" means that the monomethacrylate monomer is non-ionized or ionized in an amount of less than 20 mol% when measured in deionized water at 20°C at a pH of 2 and 12. For example, a monomethacrylate monomer is neutral if it does not contain functional groups which are permanently ionized such as quaternized amines, for example quaternary alkyl ammonium salts. For example, a neutral monomethacrylate monomer may contain functional groups whose protonated species have $pK_a$ greater than about 12.5, such as greater than about 12.7, for example greater than about 13, such as comprised between about 13 and 30. For example, a monomethacrylate monomer is neutral if it does not contain functional groups such as carboxylic acid groups, primary or secondary amine groups. Alternatively, a neutral monomethacrylate monomer may contain functional groups such as primary alcohols, primary or secondary amides or ether groups.

Monomer (la) has a solubility in water at pH 7 and 20°C equal to, or more than 2g/100ml, for example more than 3g/100ml, such as more than 4g/100ml or more than 5g/100ml. Monomer (la) is a hydrophilic one. Water solubility is conveniently measured according to OECD method 105 - water solubility adopted on 27 July 1995 (OECD GUIDELINE FOR THE TESTING OF CHEMICALS).

Monomer (la) may be selected from 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, 3-hydroxypropyl methacrylate, methacrylamide, glycidyl methacrylate, methacrylonitrile, poly(ethylene glycol) methyl ether methacrylate, for example PEG300 methacrylate methyl ether or for example a poly(ethylene glycol) methyl ether methacrylate wherein the average number of PEG units is comprised between 3 and 20, for example between 5 and 10 (e.g. triethylene glycol methyl ether methacrylate; tetraethyleneglycol methyl ether methacrylate; penta ethyleneglycol methyl ether methacrylate; decaethyleneglycol methyl ether methacrylate; pentadecaethyleneglycol methyl ether methacrylate), and mixtures thereof. For example, monomer (la) may be selected from 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, 3-
hydroxypropyl methacrylate, glycidyl methacrylate, triethylene glycol methyl ether methacrylate; PEG300 methacrylate methyl ether, and mixtures thereof. For example, monomer (la) may be selected from 2-hydroxyethyl methacrylate, glycidyl methacrylate, poly(ethylene glycol) methyl ether methacrylate and mixtures thereof.

Preferably, monomer (la) includes at least 2-hydroxyethyl methacrylate. For example, 2-hydroxyethyl methacrylate may represent at least 10% or at least 20% or at least 30% or at least 40% or at least 50% or at least 60% or at least 70% or at least 80% or at least 90% by weight of the monomer (la) in the blend. Monomer (la) may consist of 2-hydroxyethyl methacrylate.

Monomer (lb) is a neutral monoethylenically unsaturated monomer other than, i.e. different from monomer (la). Neutral is defined as discussed above.

Suitable examples of monomers (lb) may be:
- optionally substituted C_{1}-C_{4} linear or branched alkyl esters of C_{3}-C_{6} monoethylenically unsaturated mono- or poly carboxylic acids,
and
- optionally substituted C_{3}-C_{6} cycloalkyl esters of C_{3}-C_{6} monoethylenically unsaturated mono- or poly carboxylic acids.

Optional substituents may be -OH, -OR, -C(0)R, wherein R is C_{1}-C_{4} alkyl while a preferred mono- or poly carboxylic acid is methacrylic acid.

Monomer (lb) may conveniently have a solubility in water at pH 7 and 20°C of less than 2g/100ml. It may be totally insoluble in water. Monomer (lb) is a hydrophobic one. Water solubility is conveniently measured according to OECD method 105 - water solubility adopted on 27 July 1995 (OECD GUIDELINE FOR THE TESTING OF CHEMICALS).

Monomer (lb) may be selected from methyl methacrylate, ethyl methacrylate, n-propyl methacrylate, isopropyl methacrylate, tert-butyl methacrylate, isobutyl methacrylate, n-butyl methacrylate, benzyl methacrylate, isobornyl methacrylate, cyclohexyl methacrylate, tetrahydrofurfuryl methacrylate, mono(ethylene glycol) methyl ether methacrylate, di(ethylene glycol) methyl ether methacrylate, and mixtures thereof. For example, monomer (lb) may be selected from methyl methacrylate and/or ethyl methacrylate.
Preferably, monomer (lb) includes at least methyl methacrylate. Preferably, monomer (lb) includes at least ethyl methacrylate. For example, methyl methacrylate and/or ethyl methacrylate may be present in an amount of at least 10%, such as at least 20%, for example at least 30%, such as at least 40%, or at least 50%, or at least 60%, or at least 70%, such as at least 80%, for example at least 90% by weight over the combined weight of all monomers (lb) present in the blend. Monomer (lb) may consist of methyl methacrylate and/or ethyl methacrylate.

Monomer (lc) is a ionized or ionizable monoethylenically unsaturated monomer.

In the present description and unless otherwise indicated, "ionized or ionizable" means that monomer (lc) is either permanently ionized or ionized in an amount of more than 20 mol% when measured in deionized water at 20°C at a pH of either 2 or 12. For example, monomer (lc) is ionized or ionizable if it contains functional groups which are permanently ionized such as quaternized amines, for example quaternary alkyl ammonium salts. For example, monomer (lc) may contain functional groups whose protonated species have pKₐ lower than about 12.5, such as lower than about 11, for example lower than about 10, such as comprised between about 10 and 0. For example, a ionized or ionizable monomer (lc) may contain one or more of functional groups such as carboxylic acid groups, sulfonic acid groups and primary or secondary amine groups.

Examples of monomer (lc) are (meth)acrylic acid, 3-(methacryloylamino)propyl]trimethylammonium chloride, dimethylallyl ammonium chloride (DMDAAC), maleic acid, itaconic acid, 2-(diethylamino)ethyl methacrylate, dimethylaminoethyl methacrylate, 2-(tert-butylamino)ethyl methacrylate, N-[3-(dimethylamino)propyl]methacrylamide, acryloxyethyltrimethyl ammonium chloride, 2-ethyl(2-oxoimidazolidin-1-yl)methacrylate and mixtures thereof. Preferred examples are methacrylic acid and/or 3-(methacryloylamino)propyl]trimethylammonium chloride.

Compound (II) may also be referred to as crosslinker due its crosslinking function in the manufacturing of the capsule shell.

Compound (II) is a polyethylenically unsaturated monomer.
Examples of polyethylenically unsaturated monomer polymerizable by a free radical polymerization are:

- polyacrylic esters of polyols, such as ethylene glycol diacrylate, 1,4-butane diol diacrylate, 1,6-hexane diol diacrylate, trimethylol propane triacrylate, pentaerythritol tetraacrylate;

- polymethacrylic esters of polyols, such as ethylene glycol dimethacrylate, 1,3-propylene glycol dimethacrylate, 1,4-butane diol dimethacrylate, 1,6-hexane diol dimethacrylate, trimethylol propane trimethacrylate, ethoxylated pentaerythritol tetramethacrylate (MW about 585);

- acryloyloxyethyl methacrylate and 3-(acryloyloxy)-2-hydroxypropyl methacrylate;

- polyallyl amines, such as diallylamine;

- polyallyl ethers, such as dialyl ether, dialyl adipate, dialyl phthalate, dialyl isophthalate trimethylolpropane diallyl ether;

- polyacrylamido compounds such as N,N'-Methylenebisacrylamide;

- polymethacrylamido compounds such as N,N'-methylene-bis-methacrylamide; and

- divinyl-compounds such as divinyl benzene and divinyl sulfone.

In particular, examples of polyethylenically unsaturated monomers may be a polyvinyl monomer, such as divinylbenzene and trivinylbenzene, and/or di- or poly(meth)acrylate monomers. The latter monomers may contain two or more (meth)acrylate ester or amide groups.

Examples of C₂⁻C₄₄ alkyl di- or polyamide of (meth)acrylic acid are N,N-methylenebis(2-methyl(meth)acrylamide), N,N-ethylenebis(2-methyl(meth)acrylamide) and the amides obtainable by reacting melamine with (meth)acrylic acid.

Preferably, compound (II) is selected from the group consisting of a C₂⁻C₄₄ alkyl di- or polyester of methacrylic acid, a C₂⁻C₄₄ alkyl di- or polyamide of methacrylic acid and mixtures thereof, such as a C₂⁻C₄₄ alkyl di- or polyester of methacrylic acid, a C₂⁻C₄₄ alkyl di- or polyamide of methacrylic acid and mixtures thereof, for example a C₂⁻C₄₄ alkyl di- or polyester of methacrylic acid.

Suitable di- or polyesters are those resulting from the esterification of methacrylic acid with linear or branched polyhydric C₂⁻C₄₄, such as C₂⁻C₁₂, alcohols or C₂⁻C₄₄, such as C₂⁻C₁₂, polyethylene glycols. Suitable polyhydric alcohols may be those having a number
average molecular weight of up to about 6000. Suitable polyethylene glycols may be those having a number average molecular weight of up to about 7500. Polyhydric alcohols are advantageously diols. Polyethylene glycols are advantageously di-, tri- or tetra-ethylene glycols.

Examples of compound (II) are 1,4-butylene glycol dimethacrylate (molecular weight MW about 226); 1,3-butylene glycol dimethacrylate (MW about 226); pentaerythritol trimethacrylate (MW about 340); glycerol trimethacrylate (MW about 296); 1,2-propylene glycol dimethacrylate (MW about 212), 1,3-propylene glycol dimethacrylate (MW about 212), ethylene glycol dimethacrylate (MW about 198), diethylene glycol dimethacrylate (MW about 242); glycerol dimethacrylate (MW about 226), trimethylolpropane trimethacrylate (MW about 338); ethoxylated pentaerythritol tetramethacrylate (MW about 585), and mixtures thereof. Preferred examples are 1,4-butylene glycol dimethacrylate, 1,3-propylene glycol dimethacrylate, ethylene glycol dimethacrylate, diethylene glycol dimethacrylate and mixtures thereof, such as 1,4-butylene glycol dimethacrylate, ethylene glycol dimethacrylate, 1,3-propylene glycol dimethacrylate and mixtures thereof.

Compound (II) may include at least 1,4-butylene glycol dimethacrylate, 1,3-propylene glycol dimethacrylate, ethylene glycol dimethacrylate or diethylene glycol dimethacrylate, such as at least 1,4-butylene glycol dimethacrylate and/or ethylene glycol dimethacrylate and/or 1,3-propylene glycol dimethacrylate. For example, compound (II) may include at least, or consist of, 1,4-butylene glycol dimethacrylate. For example, compound (II) may include at least, or consist of, ethylene glycol dimethacrylate. For example, compound (II) may include at least, or consist of, 1,3-propylene glycol dimethacrylate. For example, compound (II) may include the above crosslinkers in an amount of at least 10%, such as at least 20%, for example at least 30%, such as at least 40%, or at least 50%, or at least 60%, or at least 70%, such as at least 80%, for example at least 90% by weight over the combined weight of compound (II) in the blend.

In one aspect, compound (II) is a $C_2-C_{24}$ alkyl di- or polyester of (meth)acrylic acid, preferably methacrylic acid, and:

A1. It contains two or more, for example 2 to 6, or 2 to 4 such as 2 or 3 or 4 (meth)acrylate ester or amide groups per monomer, and

B1. It has a MW (molecular weight, expressed as mass units) which, once divided by the
number of (meth)acrylate ester or amide groups, gives a value of more than about 85, for example more than about 90, and lower than about 135, such as lower than about 121.

In one embodiment, compound (II) meets conditions A1 and B1 above provided that any one or more of 1,4-butylene glycol dimethacrylate, ethylene glycol dimethacrylate, 1,3-propylene glycol dimethacrylate, ethylene glycol dimethacrylate and diethylene glycol dimethacrylate are excluded.

Compound (II) may be present between 30 and 60%, or between 35 and 60%, or between 40 and 55% by weight over the combined weight of compounds (I) to (II).

In one embodiment, the aqueous dispersion includes a blend as presently defined wherein a monomer (I) having water solubility at 20°C greater than 20g/100ml is contained as the compound (I) and a monomer (II) having water solubility at 20°C greater than 20g/100ml is contained as the compound (II), and the monomer blend includes more than 15% by weight and less than 60% by weight over the weight of the monomer blend of the monomers (I) and (II). Water solubility for a given monomer is measured at a pH at which that monomer is neutral (so as to avoid magnifying effect of ionization on water solubility). For example, neutral means a pH at which the given monomer is non-ionized or ionized in an amount of less than 20 mol% when measured in deionized water at 20°C.

The monomer blend may include, such as consist of:
- between 30 and 60%, such as between 35 and 60% of compound (I), and
- between 20 and 70%, such as between 35 and 60% of compound (II)
over the combined weight of compounds (I) to (II).

For example, the shell comprises in polymerized form a monomer blend including, such as consisting of:

i) between 30% and 60% by weight over the combined weight of compounds (I) to (II) in the blend of a compound (I) which is a combination of methacrylic acid with methyl or ethyl methacrylate, and

ii) between 20% and 70%, preferably between 30% and 60% by weight over the combined weight of compounds (I) to (II) in the blend of a compound (II) which is selected from a C₂-C₄ alkyl di- or polyester of methacrylic acid, a C₂-C₄ alkyl di- or polyamide of
methacrylic acid and mixtures thereof, such as a monomer selected from 1,4-butane diol
dimethacrylate, ethylene glycol dimethacrylate, 1,3-propylene glycol dimethacrylate and
mixtures thereof.

For example, the shell comprises in polymerized form a monomer blend including,
preferably consisting of:

i) between 30% and 70%, such as between 30% and 60% by weight over the
combined weight of compounds (I) to (II) in the blend of a compound (I) which is a
combination of:

ia) between 70% and 100% by weight over the weight of the combination of 2-
hydroxyethyl methacrylate;

ib) between 0% and 30% by weight over the weight of the combination of a C_1-
C_4 linear or branched alkyl ester of methacrylic acid such as methyl and/or
ethyl methacrylate;

ic) between 0% and 5% by weight over the weight of the combination of
methacrylic acid and/or 3-(methacryloylamino)propyltrimethylammonium
chloride; and

ii) between 20% and 70%, such as between 30% and 60% by weight over the
combined weight of compounds (I) to (II) in the blend of a compound (II) which is selected
from a C_2-C_4 alkyl di- or polyester of methacrylic acid, a C_2-C_4 alkyl di- or polyamide of
methacrylic acid and mixtures thereof, such as a monomer selected from 1,4-butane diol
dimethacrylate, ethylene glycol dimethacrylate, 1,3-propylene glycol dimethacrylate and
mixtures thereof.

The monomer blend may consist of compounds (I) to (II) as presently defined, meaning
that the combined amounts of compounds (I) to (II) make 100% of the weight of the blend.

The monomer blend may be substantially free of monoethylenically unsaturated monomers
other than compounds (I) and (II) as presently defined.

The monomer blend may be substantially free of polyethylenically unsaturated monomers
other than compound (II) as presently defined.

The monomer blend may be substantially free of one or more of:

- monomers, such as acrylic acid, which contain carboxylic acid (-COOH) groups
and/or primary or secondary amine groups, in either neutral or ionized form;
- C\textsubscript{1}-C\textsubscript{24} alkyl monoesters of acrylic acid;
- C\textsubscript{2}-C\textsubscript{24} alkyl poly (e.g. di-, tri-, tetra- or penta) esters of acrylic acid (crosslinkers);
- monomers containing a carboxyl anhydride group (e.g. a monomer containing symmetric or asymmetric intermolecular anhydrides of monoethylenically unsaturated monocarboxylic acids having 3 to 20 carbon atoms);
- monomers containing alkylenebis(meth)acrylamide group (e.g. N,N'-unsubstituted G\textsubscript{1,18} alkylene bis(meth)acrylamides or linear or cyclic N,N'-substituted C\textsubscript{1,18} alkylene bis(meth)acrylamides wherein substituents are selected from C\textsubscript{1,18} alkyl, C\textsubscript{1,18} hydroxyalkyl or polyoxyid-\textsuperscript{1}alkylene of 2 to 500 alkylene units or the alkyl substituents together with the nitrogen atoms to which they are attached form a 5- to 8-membered ring).

The monomer blend is preferably substantially free of C\textsubscript{1}-C\textsubscript{4} alkyl monoesters of acrylic acid and/or C\textsubscript{2}-C\textsubscript{4} alkyl polyesters of acrylic acid. For example, it is preferred that the monomer blend be substantially free of acrylic acid, C\textsubscript{1}-C\textsubscript{4} alkyl monoesters of acrylic acid, C\textsubscript{2}-C\textsubscript{4} alkyl polyesters of acrylic acid and C\textsubscript{2}-C\textsubscript{24} alkyl polyamides of (meth)acrylic acid. For example, the monomer blend may be substantially free of acrylic and/or methacrylic acid, C\textsubscript{1}-C\textsubscript{4} alkyl monoesters of acrylic acid, C\textsubscript{2}-C\textsubscript{4} alkyl polyesters of acrylic acid and C\textsubscript{2}-C\textsubscript{24} alkyl polyamides of (meth)acrylic acid.

In the present disclosure, and unless otherwise indicated, substantially free mean less than 5\% such as less than 1\%, for example 0\% by weight over the weight of the blend.

The perfume composition includes, such as consists of, a fragrance, i.e. an olfactively active (i.e. odoriferous) material typically but not necessarily providing a pleasant smell.

The perfume composition presently disclosed may also include a perfumery acceptable solvent and/or a benefit agent. For example, provided that the condition defining the weight of the fragrance with respect to the weight of the dispersion is met, the fragrance may represent at least 40\%, such as at least 60\%, for example at least 80\%, such as at least 90\% by weight over the weight of the perfume composition, the balance being represented by perfumery acceptable solvents and/or benefit agents as defined below.

The fragrance may consist of a single, typically organic, molecule or a mixture of distinct molecules. Hereinafter, these molecules will also be referred to as "perfumery molecules".
Fragrance typically used in the field of perfumery and suitable for the purposes of the present disclosure are described more fully in S. Arctander, Perfume Flavors and Chemicals 1969, Vols. I and II, Montclair, N.J and in Allured's Flavor and Fragrance Materials 2007 ISBN 978-1-93263326-9 published by Allured Publishing Corp. The term fragrance comprises both naturally occurring as well as synthetic fragrances known for use in perfumes. Perfumery molecules advantageously display balanced volatility/hydrophobicity so as to be olfactively noticeable when the microcapsules release them but also sufficiently water-insoluble to be emulsified during encapsulation.

The perfume composition may comprise at least two, such as at least four, or at least eight distinct fragrances. Effectively encapsulating high loadings of complex fragrance mixtures is particularly challenging due to the chemical diversity of these mixtures. In effect, structural differences in the various perfumery molecules may bring about greater difficulties in performing an effective encapsulation and obtain aqueous dispersions endowed with a suitable quality.

For example a fragrance may comprise at least two distinct perfumery molecules whose combination does not display a solid-liquid phase transition at a temperature comprised between -20°C and 120°C.

A fragrance may comprise one or more distinct perfumery molecules each having a molecular weight greater than 100, preferably greater than 125 and lower than 325, preferably lower than 300, more preferably lower than 275. A fragrance may comprise one or more distinct perfumery molecules each having a boiling point comprised between about 80°C and 400°C, such as between about 100°C and 350°C when measured at 760 mm Hg. It is preferable that perfumery molecules have water solubility below 1.5g/100ml at 20°C. It is possible for example that a fragrance according to the present disclosure contains at least 80% by weight over the weight of the fragrance of a perfumery molecule as defined above. For example, at least 90% by weight over the weight of all perfumery molecules present in the fragrance may be represented by one or more perfumery molecules having water solubility at 20°C comprised between 0.0005 g/100ml, such as 0.002g/100ml, and 1g/100ml.

Examples of perfumery molecules are one or more of:
(a) hydrocarbons, including 3-carene; alpha-pinene; beta-pinene; alpha-terpinene; gamma-terpinene; p-cymene; camphene; caryophyllene; cedrene; farnesene; limonene; longifolene; myrcene; ocimene; valencene; (E,Z)-1,3,5-undecatriene;

(b) aliphatic, alicyclic and alkyl aromatic alcohols, including hexanol; octanol; 3-octanol; 2,6-dimethylheptan-2-ol; 2,6-dimethylheptan-4-ol; 2-methylheptanol; 2-methyloctanol; (E)-3-hexenol; (E) and (Z)-3-hexenol; 1-octen-3-ol; (E,Z)-2,6-nonadienol; 3,7-dimethyl-7-methoxyoctan-2-ol; 9-decenol; 10-undecenol; 4-methyl-3-decen-5-ol; borneol; citronellol; geraniol; ethyl linalool; nerol; linalool; lavandulol; tetrahydrolinalool; tetrahydrogeraniol; dihydromycenol; tetrahydromycenol; 2,6-dimethyl-3,5-octadien-2-ol; 3,7-dimethyl-4,6-octadien-3-ol; menthol; isopulegol; alpha-terpineol; terpineol-4; menthan-8-ol; menthan-1-ol; menthan-7-ol; isoborneol; nopol; vetiverol; guaiol; benzyl alcohol; 1-phenylethyl alcohol; 2-phenylethyl alcohol; 3-phenylpropanol; 2-phenylpropanol; 2-phenoxyethanol; 2,2-dimethyl-3-phenylpropanol; 2,1-dimethyl-2-phenylethyl alcohol; 1,1-dimethyl-3-phenylpropanol; 1-ethyl-1-methyl-3-phenylpropanol; 2-methyl-5-phenylpentanol; 3-methyl-5-phenylpentanol; 3-phenyl-2-propanol; 4-methoxybenzyl alcohol; 1-(4-isopropylphenyl)ethanol; alpha-3,3-trimethylcyclohexylmethanol; 2-methyl-4-(2,2,3-trimethyl-3-cyclopent-1-yl)butanol; 2-methyl-4-(2,2,3-trimethyl-3-cyclopent-1-yl)-2-buten-1-ol; 2-ethyl-4-(2,2,3-trimethyl-3-cyclopent-1-yl)-2-buten-1-ol; 2-ethyl-4-(2,2,3-trimethyl-3-cyclopent-1-yl)-2-buten-1-ol; 3-methyl-5-(2,2,3-trimethyl-3-cyclopent-1-yl)-4-penten-2-ol; 3,3-dimethyl-5-(2,2,3-trimethyl-3-cyclopent-1-yl)-4-penten-2-ol; 1-(2,2,6-trimethylcyclohexyl)pentan-3-ol; 1-(2,2,6-trimethylcyclohexyl)hexan-3-ol; 4-tert.-butylcyclohexanol; 2-tert butylcyclohexanol, 3,3,5-trimethylcyclohexanol; 3-isocamphylcyclohexanol; 2,6,9-trimethyl-Z2,Z5,E9-cyclododecatrien-1-ol; 2-isobutyl-4-methyltetrahydro-2H-pyran-4-ol; (1S,2R,5S,7R,8R)-2,6,6,8-tetramethyltricyclo[5.3.1.01,5]undecan-8-ol; and the corresponding formate, acetate, propionate, isobutyrate, butyrate, isovalerate, pentanoate, hexanoate, crotonate, glycolate, 3-methyl-2-butenoate esters thereof;

(c) phenols, phenyl ethers and phenyl esters including: estragole; anethole; eugenol; eugenyl methyl ether; isoeugenol; isoeugenyl methyl ether; thymol; carvacrol; diphenyl ether; beta-naphthyl methyl ether; beta-naphthyl ethyl ether; beta-naphthyl isobutyl ether; 1,4-dimethoxybenzene; eugenyl acetate; 2-methoxy-4-methylphenol; 2-ethoxy-5-(1-propenyl)phenol; 2-methoxy-4-propylphenol; p-cresyl phenylacetate.
(d) aliphatic, cycloaliphatic, alkyl aromatic and aromatic aldehydes, including hexanal; heptanal; octanal; nonanal; decanal; undecanal; dodecanal; tridecanal; 2-methyloctanal; 2-methylnonanal; (E)-2-hexenal; (Z)-4-heptenal; 2,6-dimethyl-5-heptenal; 10-undecenal; (E)-4-decenal; 2-dodecenal; 2,6,10-trimethyl-5,9-undecadienal; heptanal diethyl acetal; 1,1-dimethoxy-2,2,5-trimethyl-4-hexene; citronellyl oxyacetaldehyde; alpha-sinensal; beta-sinensal; 2,4-dimethyl-3-cyclohexenecarbaldehyde; 2-methyl-4-(2,2,6-trimethylcyclohexen-1-yl)-2-butenal; 4-(4-hydroxy-4-methylpentyl)-3-cyclohexenecarbaldehyde; 4-(4-methyl-3-penten-1-yl)-3-cyclohexenecarbaldehyde; geranial; neral; citronellal; 7-hydroxy-3,7-dimethyloctanal; 7-methoxy-3,7-dimethyloctanal; 2,6,10-trimethyl-9-undecenal; benzaldehyde; phenylacetaldehyde; 3-phenylpropanal; hydratropaldehyde; 4-methylbenzaldehyde; 4-methylphenylacetaldehyde; 3-(4-ethylphenyl)-2,2-dimethylpropanal; 2-methyl-3-(4-isopropylphenyl)propanal; 2-methyl-3-(4-tert-butylphenyl)propanal; 3-(4-tert-butylphenyl)propanal; cinnamaldehyde; alpha-butylicinnamaldehyde; alpha-amylcinnamaldehyde; alpha-hexylcinnamaldehyde; 3-methyl-5-phenylpentanal; 4-methoxybenzaldehyde; vanillin; ethyl vanillin; vanillin isobutyrate; 3,4-methylenedioxybenzaldehyde; 3,4-dimethoxybenzaldehyde; 2-methyl-3-(4-methoxyphenyl)propanal; 2-methyl-3-(4-methylenedioxyphenyl)propanal; and the dimethyl, diethyl and propylene glycol acetals thereof.

(e) aliphatic, alicyclic, and alkylaromatic ketones including 2-heptanone; 2-octanone; 3-octanone; 2-nonanone; 5-methyl-3-heptanone; 2,4,4,7-tetramethyl-6-octen-3-one; menthone; isomenthone; carvone; camphor; fenchone; alpha-ionone; bet-ionone; alphaminionone; beta-n-methylionone; alpha-isomethylionone; beta-isomethylionone; alpha-irone; alpha-damascone; beta-damascone; beta-damascenone; delta-damascone; gamma-damascone; 1-(2,4,4-trimethyl-2-cyclohexen-1-yl)-2-buten-1-one; 1,3,4,6,7,8a-hexahydro-1,1,5,5-tetramethyl-2H-2,4a-methanonaphthalen-8(5H)-one; 1-(3,3-dimethylcyclohexyl)-4-penten-1-one; 1-(5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one; 2,3,8,8-tetramethyl-1,2,3,4,5,6,7,8-octahydro-2-naphthalenyl methyl ketone; methyl-2,6,10-trimethyl-2,5,9-cyclooctadecatrienyl ketone; tert.-butyl(2,4-dimethyl-3-cyclohexen-1-yl)ketone; acetophenone; 4-methylacetophenone; 4-methoxyacetophenone; 4-tert.-butyl-2,6-dimethylacetophenone; 4-phenyl-2-butanone; 4-(4-hydroxyphenyl)-2-butanone; 1-(2-naphthalenyl)ethanone; benzophenone; 1,1,2,3,3,6-hexamethyl-5-indanyl methyl ketone; 6-tert.-butyl-1,1-dimethyl-4-indanyl methyl ketone; 1-[2,3-dihydro-1,1,2,6-tetramethyl-3(1-methylethyl)-1H-5-indenyl]ethanone; S',e,J',e'-tetrahydro-S'.S'.e''e'-hexamethyl^
acetonaphthone; 4-tert.-butylcyclohexanone; 2,2,5-trimethyl-5-pentylcyclopentanone; 2-heptylcyclopentanone; 2-pentylcyclopentanone; 2-hydroxy-3-methyl-2-cyclopenten-1-one; 3-methyl-cis-2-penten-1-yl-2-cyclopenten-1-one; 3-methyl-2-pentyl-2-cyclopenten-1-one; 3-methyl-4-cyclopentadecanone; 3-methyl-5-cyclopentadecanone; 3-methylcyclopentadecanone; 4-(1-ethoxyvinyl)-3,3,5,5-tetramethylcyclohexanone; 4-tert-pentylcyclohexanone; 5-cyclohexadecen-1-one; 6,7-dihydro-1,2,3,3-pentamethyl-4(5H)-indanone; 9-cycloheptadecen-1-one; cyclopentadecanone; cyclohexadecanone;

(f) cyclic, cycloaliphatic and alkyl aromatic ethers, including cineol; cedryl methyl ether; cyclododecyl methyl ether; (ethoxymethoxy)cyclododecane; alpha-cedrene epoxide; 3a,6,6,9a-tetramethyl-dodecahydronaphtho[2,1-b]furan; 3a-ethyl-6,6,9a-trimethyl-dodecahydro-naphtho[2, 1-bfuran; 1,5,9-trimethyl-1,3-oxabicyclo[1.0.1]trideca-4,8-diene; rose oxide; 2-phenylethyl methyl ether; 2-phenylethyl isoamyl ether; 2-phenylethyl 1-ethoxyethyl ether; phenylacetaldehyde dimethyl acetal; phenylacetaldehyde diethyl acetal; hydratropaldehyde dimethyl acetal; phenylacetaldehyde glycerol acetal; 2,4,6-trimethyl-4-phenyl-1,3-dioxane; 4,4a,5,9b-tetrahydroindeno[1,2-d]-m-dioxin; 4,4a,5,9b-tetrahydro-2,4-dimethylindeno[1,2-d]-m-dioxin;

(g) aliphatic nitriles, including 2-nonenenitrile; 2-tridecenenitrile; 2,12-tridecenenitrile; 3,7-dimethyl-2,6-octadienitrile; 3,7-dimethyl-6-octenenitrile;

(h) esters of aliphatic, cycloaliphatic, alkyl aromatic and aromatic carboxylic acids, including (E)- and (Z)-3-hexenyl formate; ethyl acetoacetate; isoamyl acetate; hexyl acetate; 3,5,5-trimethylhexyl acetate; 3-methyl-2-butenyl acetate; (E)-2-hexenyl acetate; (E)- and (Z)-3-hexenyl acetate; octyl acetate; 3-octyl acetate; 1-octen-3-yl acetate; ethyl butyrate; butyl butyrate; isoamyl butyrate; hexyl butyrate; (E)- and (Z)-3-hexenyl isobutyrate; hexyl crotonate; ethyl isovalerate; ethyl 2-methylpentanoate; ethyl hexanoate; allyl hexanoate; ethyl heptanoate; allyl heptanoate; ethyl octanoate; ethyl (E,Z)-2,4-decadienoate; methyl 2-octynoate; methyl 2-nonynoate; allyl-2-isoamyloxyacetate; methyl-3,7-dimethyl-2,6-octadienoate; allyl 3-cyclohexylpropionate; allyl cyclohexyloxyacetate; methyl dihydrojasmonate; methyl jasmonate; methyl 2-hexyl-3-oxocyclopentanecarboxylate; ethyl 2-ethyl-6,6-dimethyl-2-cyclohexenecarboxylate; ethyl 2,3,6,6-tetramethyl-2-cyclohexenecarboxylate; ethyl 2-methyl-1,3-dioxolane-2-acetate; benzyl acetate; benzyl propionate; benzyl isobutyrate; benzyl isovalerate; 2-phenylethyl acetate; 2-phenylethyl propionate; 2-phenylethyl isobutyrate; 2-phenylethyl isovalerate; 1-
phenylethyl acetate; alpha-trichloromethylbenzyl acetate; alpha, alpha-dimethylphenylethyl acetate; alpha, alpha-dimethylphenylethyl butyrate; cinnamyl acetate; 2-phenoxyethyl isobutyrate; 4-methoxybenzyl acetate; methyl benzoate; ethyl benzoate; hexyl benzoate; benzyl benzoate; methyl phenylacetate; ethyl phenylacetate; geranyl phenylacetate; phenylethyl phenylacetate; methyl cinnamate; ethyl cinnamate; benzyl cinnamate; phenylethyl cinnamate; cinnamyl cinnamate; allyl phenoxyacetate; methyl salicylate; isoamyl salicylate; hexyl salicylate; cyclohexyl salicylate; cis-3-hexenyl salicylate; benzyl salicylate; phenylethyl salicylate; methyl 2,4-dihydroxy-3,6-dimethylbenzoate; ethyl 3-phenylglycidate; ethyl 3-methyl-3-phenylglycidate;

(i) lactones, including 1,4-octanolide; 3-methyl-1,4-octanolide; 1,4-nonanolide; 1,4-decanolide; 8-decen-1,4-olide; 1,4-undecanolide; 1,4-dodecanolide; 1,5-decanolide; 1,5-dodecanolide; 1,15-pentadecanolide; cis and trans-11-pentadecen-1,15-olide; cis- and trans-12-pentadecen-1,15-olide; 1,16-hexadecanolide; 9-hexadecen-1,16-olide; 10-oxa-1,16-hexadecanolide; 11-oxa-1,16-hexadecanolide; 12-oxa-1,16-hexadecanolide; ethylene 1,12-dodecanedioate; ethylene 1,13-tridecanedioate; coumarin; 2,3-dihydrocoumarin; octahydrocoumarin; and

(j) nitrogen-containing aromatic compounds, including methyl anthranilate; methyl N-methylanthranilate; Schiff bases of methyl anthranilate with 7-hydroxy-3,7-dimethyloctanal; 2-methyl-3-(4-tert.-butylphenyl)propanal or 2,4-dimethyl-3-cyclohexene-carbaldehyde; 6-isopropylquinoline; 6-isobutylquinoline; 6-sec.-butylquinoline; indole; 2-methoxy-3-isopropylpyrazine; 2-isobutyl-3-methoxypyrazine.

It is convenient that fragrances for incorporation in a perfume composition as presently disclosed be selected so that the perfume composition contains less than 25%, such as less than 15%, for example less than 5% by weight of a perfumery molecule selected from the group consisting of limonene (CAS: 5989-27-5), carvone (CAS: 99-49-0, 2244-16-8), ethyl safranate (CAS: 35044-57-6), myrcene (CAS: 123-35-3), myrcenol (CAS: 543-39-5), myrcenyl acetate (CAS: 1118-39-4), eugenol (CAS: 97-53-0), eugenyl acetate (CAS: 93-28-7), chavicol (CAS: 501-92-8), estragol (CAS: 140-67-0), anethol (CAS: 104-46-1), and mixtures thereof.

The perfume composition may also include a perfumery acceptable solvent. Solvents are conventionally used in the fragrance industry to dilute olfactively powerful ingredients and
to facilitate the handling of solid ingredients by dissolving them and handling them as liquids, or simply as a diluent to reduce overall fragrance cost per unit weight. Typically, suitable solvents are water-immiscible solvents, for example solvents having water solubility of less than 10g/L. Examples of perfumery acceptable solvents are water insoluble hydrocarbon solvents (such as the Isopar® family from ExxonMobil), benzyl benzoate, isopropyl myristate, dialkyl adipates, citrate esters (such as acetyl triethyl citrate and acetyl tributyl citrate) and diethyl phthalate. If present, water miscible solvents (e.g. solvents with water solubility of more than 10g/100ml), such as propylene glycol dipropylene glycol, and butylene glycols should preferably be dosed at as low level as possible.

The perfume composition may also include benefit agents. Benefit agents are typically emulsifiable materials having synthetic or natural origin and which can survive storage to deliver a benefit through the use a product containing the microcapsules, such as household, personal care or cosmetic products. Examples of benefit agents are:
- agents which suppress or reduce malodour and its perception by adsorbing odour such as zinc ricinoleate,
- agents improving microcapsule physical-chemical properties such as sucrose octa-acetate or sucrose hexabutyrate di-acetate,
- gelling agents such as hydroxy fatty acids or the Sylvaclear™ range of materials available from Arizona Chemicals,
- agents which provide a warming or cooling effect such as cyclohexane carboxamide N-ethyl-5-methyl-2-(1-methylethyl); N,2,3-trimethyl-2-isopropylbutamide; menthy lactate; (-)-menthoxypropane-1,2-diol,
- insect repellents such as ethylbutylacetyleaminopropionate; N,N-diethyl toluamide;
1-piperidinocarboxylic acid; 2-(2-hydroxyethyl)-1-methylpropyl ester; p-menthane-3,8-diol,
- antimicrobial agents such as triclosan™ compound having CAS N° 3380-34-5, or the methyl, ethyl, propyl and butyl para hydroxy benzoate esters,
- UV absorbers such as octyl methoxycinnamate, butylmethoxydibenzoylmethane, and bis ethylhexyloxyphenolmethoxyphenyltriazine.

The present disclosure discloses a product comprising the aqueous dispersion as defined above. The product may be a non-edible consumer goods product, a household cleaner or laundry product, a personal care product or a cosmetic product.
Unless otherwise indicated, non-edible means non-intended for ingestion by humans or animals. This includes non-food products that may accidentally be swallowed during normal use. Notably, included within the definition of non-edible products are products for dental and oral care, such as toothpastes, mouth washes and lip balms which although not intended for ingestion may nevertheless accidentally enter the gastro-intestinal tract.

The formulations and ingredients of liquid household, laundry, personal care and cosmetic products in which microcapsules of the invention may be used are well known to those skilled in the art, reference may be made to the following works:

- Formulating Detergents and Personal Care Products A guide to Product Development by L Ho Tan Tai, ISBN 1-893997-10-3 published by the AOCS Press

Personal care and cosmetic products may include products that can be applied to the skin, hair and nails either as leave on or rinse off product. Personal care and cosmetic products include powders, creams, emulsions, lotions, gels and oils for the skin (face, hands, feet etc), tinted bases (liquids and pastes) and liquid impregnated tissues; products for applying and removing make-up from the face and eyes; hair care products including hair tints and bleaches; products for waving, straightening, setting and fixing hair; shaving products including creams, foams mousse and depilatory products; sun bathing products and products for tanning without the sun; deodorant and antiperspirant products.

Advantageously a personal care or cosmetic product is selected from the group consisting of a shaving aid, a shampoo, a hair-conditioner product, a leave-on-skin-care product, a skin cleansing or washing product (such as a rinse-off skin cleansing or washing product), a moist tissue and a body spray, deodorant or antiperspirant.


Shampoos and hair conditioners specifically include two-in-one shampoos and shampoos
especially formulated for dry or greasy hair or containing additives such as antidandruff agents. Hair conditioners may be rinse off or leave on hair conditioners also included are hair tonics, bleaches colorants, setting and styling products. Reference can be made for example to US 6,162,423, US 5,968,286, US 5,935,561, US 5,932,203, US 5,837,661, US 5,776,443, US 5,756,436, US 5,661,118, US 5,618,523.

Leave-on-skin-care products comprise skin washing products, moist tissues, body sprays, deodorants and antiperspirants.

Skin washing products specifically include beauty and hygiene bar soaps, shower gels, liquid soaps, body washes, exfoliating gels and pastes (reference can be made for example to US3,697,644; US4,065,398; US4,387,040).

Moist tissues (wipes) specifically include skin cleansing wipes, baby wipes, make-up removal wipes and skin refreshing wipes (reference can be made for example to US4,775,582; WO02/07701; WO2007/069214 and W095/16474).

Body sprays, deodorants and antiperspirants specifically include sticks, liquid roll-on applicators and pressurized sprays.

Examples of household cleaners and laundry products are:
- hard surface cleaners such as cleaners for floors, solid work surfaces, tiled surfaces, crockery by hand or machine washing and mirrors and glass,
- soft furnishing treatments such as liquid cleaners and refresher products such as odour treatment agents as exemplified by Febreze® (P&G),
- powdered laundry detergents, detergent tablets and bars, laundry detergent liquids include light duty liquids, heavy duty liquids, concentrated liquid detergents, non or low aqueous laundry liquids and more specialised cleaners for woollen or dark garments,
- fabric softeners and pre- and post-wash treatments such as tumble drier sheets, ironing waters and wash additives.

Advantageously, a laundry product is selected from the group consisting of a fabric softener, a fabric conditioner and a laundry detergent.

Household cleaners may be in the form of cream cleaners, isotropic liquid cleaners, spray
cleaners and pre-moistened surface cleaning wipes (reference can be made for example to WO91/08283, EP743280, W096/34938, WO01/23510, and W099/28428).

Fabric softeners and conditioners specifically include both conventional diluted (e.g. 2% to 8% by weight of softener in the product) liquid active concentration softeners and concentrated (e.g. 10% to 40% by weight of softener in the product) liquid active concentration softeners as well as fabric conditioners which may contain ingredients to protect colors or garment shape and appearance (reference can be made for example to US 6,335,315, US 5,674,832, US 5,759,990, US 5,877,145, US 5,574,179).

Laundry detergents, particularly liquid laundry detergents, specifically include light duty liquid detergents and heavy duty liquid detergents which may be structured multi-phase liquids or isotropic liquids and which may be aqueous or non-aqueous liquids. These liquids may be in bottles or unit dose sachets and they may optionally contain bleaching agents or enzymes (reference can be made for example to US 5,929,022, US 5,916,862, US 5,731,278, US 5,470,507, US 5,466,802, US 5,460,752, and US 5,458,810).

The products presently disclosed may contain water and/or surface active material, either as an emulsifier, if the product is an emulsion, or as a detergent active material if the product has some kind of cleaning function. In certain embodiments the concentration of surface active material in the product will be within the range 0.1-60% by weight; usually the level of surface active material will be 50% by weight or lower; for most products the level of surface active material will be 30% by weight or lower. On the other hand, the level of surface active material will usually be at least 0.1% by weight preferably greater than 1.0% and more preferably greater than 3.0% by weight. Certain product formulations are water sensitive (e.g. anti-perspirant, deodorant formulations, non-aqueous liquids packaged in water soluble polyvinyl alcohol films), and for these applications it may be desirable to spray dry the microcapsules to remove water, before the microcapsules are incorporated in the product formulation. For products which have a cleaning function it is likely the level of surface active material will be higher, typically greater than 10% by weight and preferably greater than 15% by weight. All percentages are expressed by weight over the weight of the product.

Examples of leave-on products containing emulsifiers are: hand and body lotions, make up removing lotions, skin creams, sunscreen products and sunless tanning products and
domestic freshener sprays. Also included are articles of manufacture impregnated with liquids, for example pads or wipes impregnated with lotions for make-up application or removal, or to apply sunscreen compounds or sunless tanning agents, for personal cleansing e.g. as moist toilet tissue or baby wipes.

Examples of personal cleansing products containing detergents are: shampoos, body washes, liquid soaps. Some cleaning products may be considered leave on products even though they are used for cleansing if there is no rinsing or further cleaning action after use. Baby wipes are an example, although used for cleaning the liquid deposited on the skin is not removed by rinsing.

The non-rinsed cosmetic, toiletry and personal care compositions described herein can contain various emulsifiers which are useful for emulsifying the various components of the products. Suitable emulsifiers can include any of a wide variety of non-ionic, cationic, anionic, and zwitterionic surface active materials as disclosed in publications such as McCutcheon's, Detergents and Emulsifiers, North American Edition (1986), published by Allured Publishing Corporation and in the following patents: U.S. 5,011,681; U.S. 4,421,769; and U.S. 3,755,560.

Experimental evidence shows that the composition of certain products such as setting lotions, eau de toilettes, body spray aerosols, hair foams, which contain short hydrocarbon chain alcohols may negate the benefit brought about by the microcapsules presently disclosed. Therefore, it is preferable that the products do not contain significant amounts (e.g. more than 2.5% or more than 5%, such as more than 10%, or more than 20% or more than 50% or more than 70% by weight over the weight of the product) of short hydrocarbon chain alcohols such as aliphatic C$_1$-C$_4$ alcohols (e.g. ethanol or isopropanol). Without wishing to be bound by any theory, it is believed that short hydrocarbon chain alcohols might affect the microcapsule integrity thereby facilitating the leakage of the perfume content.

Microcapsules amount into liquid household, laundry, personal care and cosmetic products may vary depending on several aspects such as the desired microcapsule concentration, the proportion of fragrance within the microcapsule and the amount of fragrance necessary to create the olfactory effect desired. After removing all liquid components from a given product (i.e. measured as dry weight) the a plurality of
microcapsules may be present from 0.01 to 10% by weight, preferably from 0.05% to 2.5% by weight, more preferably from 0.1 to 1.25% by weight over the weight of the product. The a plurality of microcapsules may be incorporated into the products by any conventional means, usually in the form of dispersion added at a suitable stage in the product manufacturing process but usually after any high shear mixing stage. If liquid at room temperature, it is preferable that the product into which the microcapsules are to be added has a viscosity greater than 20Mpas, for example greater than 100Mpas, or greater than 1,000Mpas, or even greater than 10,000Mpas, when measured at a low (e.g. 10rpm) spindle speed. Conveniently, the product shows shear thinning rheology. If necessary, viscosity can be adjusted through the addition of conventional viscosity modifying agents. Suitable agents as well as equipment and conditions to measure the viscosity of a product are discussed in Rheology Modifiers Handbook Practical Uses and Applications by M R Rosen and D Braun published by William Andrew Publishing in 2000 with ISBN 978-0-8155-1441-1.

Microcapsules may be prepared using a range of known conventional methods such as coacervation, interfacial polymerization, free radical polymerization, or polycondensation. These techniques are well-know, see e.g., US3516941, US4520142, US4528226, US4681806, US4145184; GB-A-2073132; W099/17871; and MICROENCAPSULATION Methods and Industrial Applications Edited by Benita and Simon (Marcel Dekker, Inc. 1996).

Advantageously, the aqueous dispersion presently disclosed may be manufactured by free radical polymerization (e.g. suspension free-radical polymerization). Accordingly, the present disclosure discloses a free radical polymerization process for the manufacture of an aqueous dispersion including a plurality of microcapsules as defined above, said process including the following steps:

a) providing an oil-in-water emulsion having an oil phase and a water phase, said emulsion being obtainable by mixing:

- colloidal particles having an average primary particle size comprised between 5nm and 1µm as defined above,
- a polymerization initiator,
- a perfume composition including a fragrance,
- an emulsifier, and
- the monomer blend as defined above,
b) triggering polymerization within the emulsion obtained in step a),
c) letting the polymerization propagate thereby obtaining microcapsules,
wherein the fragrance represents between 20% and 70% by weight of the weight of the
emulsion.

Preferably, the fragrance represents between 20% and 45% by weight of the weight of the
emulsion. Greater amounts, such as up to 70% by weight may be used to compensate for
the possible dilution brought about by addition of optional process ingredients such as
optional additions of monomers in the course of the process, as disclosed below. Similarly,
the overall amount of certain ingredients (e.g. colloids such as PVA) may be split and
added at different stages during the process. If these ingredients are for example water
soluble ingredients, the extra water brought into the reaction environment may determine
a diluting effect.

The fragrance amount of 20%-45% as calculated by weight over the weight of the
dispersion may conveniently be measured at any point in time throughout process step c)
of letting the polymerization propagate thereby obtaining microcapsules. For example, it
can be measured at the very end of step c) or towards the end of the polymerization. In
effect, it might be desirable to add/remove some water to/from the final dispersion at the
very end of step c) so that the concentration of the fragrance in the dispersion might
appear to be lower/higher than the claimed range.

In one embodiment, the process does not include any post-polymerization concentration
step to be performed on the dispersion. In effect, the dispersion presently disclosed
already contains a fragrance loading which makes it suitable for direct incorporation into
final products.

Steps a) to c) may be performed in the order in which they are presented.

In one aspect, the present disclosure discloses an aqueous dispersion including a
microcapsule and which is obtainable by a free radical polymerization process as defined
above.

Polymerization may be conventional radical polymerization or living radical polymerization.

Such radical polymerization processes are known to persons skilled in the art and are
further described e.g. in Moad, Graeme; Solomon, David H.; The Chemistry of Radical Polymerization, 2nd ed.; Elsevier, 2006. A discussion of living radical polymerization, can be found for example in Braunecker, Wade A.; Matyjaszewski, Krzysztof; "Controlled/Living Radical Polymerization: Features, Developments, and Perspectives"; Progress in Polymer Science 2007, Volume 32, Issue 1, Pages 93-146.

The monomers of the blend are as defined above. They are weighed and mixed so as to obtain a monomer blend as defined above. Then, this blend is used in the preparation of the oil-in-water emulsion.

An oil-in-water emulsion (step a)) may be prepared by mixing and dissolving the oil soluble ingredients into a homogeneous solution while separately mixing and dissolving the water soluble ingredients into a homogenous solution. Solid colloidal particles are typically admixed to the water solution. An emulsion may be obtained by mixing e.g. with a high shear mixer and for sufficient time the two solutions to create a stable emulsion of a desired particle size. At the same time the emulsion may be purged with nitrogen or other inert gas. Once the air has been removed, polymerization may be heat induced (step b)) by elevating the temperature. The exact temperature and rate of temperature increase is determined by the initiator or combination of initiators to be used. Typically polymerization temperatures are between 40°C to 90°C. The rate of polymerization can be controlled in a known manner by appropriate choice of the temperature and amount of polymerization initiator for the particular monomers and initiator in an experiment. Once the polymerization temperature has been reached, polymerization continues (step c)) for a further period, for example 2 to 6 hours, in order to complete the reaction of the monomers.

Additional initiator can be added later in the polymerization to reduce the level of residual monomers. Monomers may be added during the course of the reaction to control dosage. Salts may be added e.g. to buffer the pH.

The emulsion includes a polymerization initiator. Radicals can be generated by thermal decomposition of compounds such as peroxy and azo compounds, or by photolysis with UV radiation or by redox reactions. Suitable initiators may be soluble in the oil phase and/or the aqueous phase of the emulsion. For example, an initiator may be:

- a thermal polymerization initiator, and/or
- a photopolymerization initiator, and/or
- a redox initiator including a radical-generating reductant/oxidant pair.

Thermal polymerization initiators may be present in an amount comprised between 0.1% and 5% by weight over the combined weight of compounds (I) and (II) in the blend.

Examples of thermal polymerization initiator are:
dilauroyl peroxide,
benzoyl peroxide,

\[ \alpha,\alpha'-\text{azoisobutyronitrile}, \]
\[ 2,2''-\text{azobis}(2,4\text{-dimethyl valeronitrile}), \]
dimethyl 2,2'-azobis(2-methylpropionate),
\[ 1,1'-\text{azo-bis-1-Cyclohexanenitrile}, \]
di-tert-butyl peroxide (CAS: 75-91-2),
potassium persulphate,
ammonium persulfate,
\[ 4,4'^{-}\text{azobis(4-cyanovaleric acid)}, \]
\[ 2,2''-\text{azobis}[2-(2\text{-imidazolin-2-yl})\text{propane}]\text{dihydrochloride}, \]
\[ 2,2''-\text{azobis}(2\text{-methylpropionamidine})\text{dihydrochloride}, \]
\[ 2,2''-\text{azobis}[2-(2\text{-imidazolin-2-yl})\text{propane}], \]
\[ 2,2''-\text{azobis}[2\text{-methyl-N-}(2\text{-hydroxyethyl})\text{propionamide}], \]
and mixtures thereof.

Photopolymerization initiators may be present in an amount comprised between 0.5% and 5% by weight over the combined weight of compounds (I) and (II) in the blend.

Examples of photopolymerization initiator are:
alpha hydroxyl ketones,
alpha amino ketones,
alpha and beta naphthyl carbonyl compounds,
benzoin ethers such as benzoin methyl ethers,
benzophenone,
acetophenone,
benzaldehyde,
xanthone,
9,10-anthraquinone,  
1-hydroxy-cyclohexyl-phenyl-ketone (Irgacure™ 184), and  
mixtures thereof.

5 A redox initiator includes a radical-generating reductant/oxidant pair. In the pair
- the oxidant may be present in an amount comprised between 0.01% and 3.0%,  
such as between 0.02% and 1.0%, or between 0.05% and 0.5% by weight over the
combined weight of compounds (I) and (II) in the blend, and/or
- the reductant may be present in an amount comprised between 0.01% and 3.0%,  
such as between 0.01% and 0.5%, or between 0.025% and 0.25% by weight over
the combined weight of compounds (I) and (II) in the blend.

Examples of oxidant for the redox pair are:
- salts of peroxodisulfuric acid such as sodium monopersulfate, sodium persulfate,  
potassium persulphate, ammonium persulfate,
- cumene hydroperoxide,
- tert-butyl hydroperoxide,
- di-tert-amyl peroxide,
- tert-butyl peroxybenzoate,
- t-amyl hydroperoxide,
- hydrogen peroxide, and
- mixtures thereof

Examples of reductant for the redox pair are:
- sodium sulphite,
- sodium metabisulphite,
- sodium formaldehyde sulphotylate,
- ascorbic acid,
- sodium dithionite, and
- mixtures thereof.

The emulsion includes an emulsifier. The emulsifier includes a protective colloid and may
further include a surfactant. Protective colloids and surfactants are conventionally used in
emulsion polymerization and in suspension polymerization to stabilize oil-in-water
emulsions created by mechanical agitation while the polymerization occurs.
A suitable protective colloid has an average molecular weight comprised between 500 and 1,000,000 g/mol, for example between 1,000 and 500,000 g/mol.

Examples of protective colloid are:
- cellulose derivatives such as hydroxyethylcellulose, carboxymethylcellulose and methylcellulose,
- polyvinylpyrrolidone,
- copolymers of N-vinylpyrrolidone,
- polyvinyl alcohols obtainable by full to partial hydrolys of polyvinyl acetates,
- polyacrylic and/or polymethacrylic acid,
- copolymers of acrylic acid and methacrylic acid,
- ionic colloids such as sulphonic-acid-group-containing water-soluble polymers (e.g. 2-acrylamido-2-alkylsulphonic acids and styrene sulphony acids), and
- mixtures thereof.

Advantageously, the protective colloid is a water-soluble protective colloid. Preferably, this means that the colloid has solubility in water of at least 5 g/L at 20°C.

Advantageously, the protective colloid includes at least polyvinyl alcohol (PVA), such as a PVA obtainable by full to partial hydrolys of polyvinyl acetates.

The protective colloid may be present in an amount comprised between 0.1% and 10% by weight over the weight of the water phase of the oil-in-water emulsion.

Step b) entails inducing decomposition of polymerization initiator. Polymerization may be initiated either in the oil phase (suspension polymerization) or the water phase (emulsion polymerization) of the emulsion depending on the choice of the initiator(s). It is also possible to initiate polymerization in the two phases separately by appropriate choice of initiator and conditions. Step b) may comprise:
- subjecting the oil-in-water emulsion to heat, and/or
- subjecting the oil-in-water emulsion to UV light, and/or
- triggering a redox reaction within the oil-in-water emulsion.

The microcapsules of the invention may also comprise on their surface (e.g. surface
grafted) deposition aids, i.e. aids aiming to optimize the deposition of microcapsule on the intended substrate (examples of substrates are hair, skin and fabrics such as cotton). Examples and use of deposition aids on microcapsules are for example disclosed in EP21558474, EP1572767, EP2188364 and EP1019478.

The deposition aid may be present in an amount comprised between 0.1% and 10% by weight over the dry weight of a microcapsule.

The deposition aid may be a polymeric deposition aid. Examples may be synthetic or natural polymers or combinations thereof (e.g. through partial chemical modification of natural polymers).

The deposition aid may be a peptide, a protein, or a chemical derivative thereof, providing for a binding to the intended substrates. For example cellulases bind to cotton while proteases bind to wool, silk or hair.

The deposition aid may be a polysaccharide or a chemical derivative thereof. The polysaccharide preferably has a [beta]-1,4-linked backbone. Examples of polysaccharide are cellulose, a cellulose derivative, or another [beta]-1,4-linked polysaccharide binding to cellulose, such as polymannan, polyglucan, polyglucosomannan, polyxyloglucan and polygalactomannan or mixtures thereof. For example, the polysaccharide is selected from the group consisting of polyxyloglucan and polygalactomannan. Highly preferred polysaccharides are selected from locust bean gum, tamarind gum, xyloglucan, non-ionic guar gum, cationic starch and mixtures thereof. For example, the deposition aid is locust bean gum, or chemical derivatives thereof.

In one embodiment, the process presently disclosed may include a step d) to be performed after step c) and including binding a deposition aid to the microcapsules in the plurality of microcapsules. The deposition aid may be adsorbed to the microcapsule shell or physically and/or chemically bonded to the microcapsule shell. Adsorption (i.e. physical binding) of the deposition aid to the already-formed microcapsule shell may rely on hydrogen bonding, Van Der Waals or electrostatic attraction between the deposition aid and the microcapsule. The deposition aid is thus external to the microparticle and is not, to any significant extent, within the shell and/or within the microcapsule core.
Alternatively, a deposition aid may be part of the emulsion provided in step a). In this case, the deposition aid will be integral part of the microcapsule shell. This situation is known as "entanglement". By entanglement as used herein is meant that the deposition aid is partially buried within the interior of the microcapsule. This is obtained by adding the deposition aid to the emulsion e.g. before the polymerization is triggered. By letting the polymerization propagate, part of the deposition aid remains entrapped and bound in the extending polymer that will form the microcapsule shell whilst the remainder is free to extend into the aqueous phase of the emulsion. In this manner, the deposition aid is only partially exposed at the microcapsule surface.

Further embodiments and advantages of the present invention will become apparent to a skilled reader in light of the examples provided below.

Two alternatives for the General manufacturing process are disclosed. Alternative 1 is followed for monomer blends that do not comprise monomers with hydroxyl groups or monomers that are not solubilized in the fragrance. Alternative 2 is followed for monomer blends that comprise monomers with hydroxyl groups and/or monomers that are not solubilized in the fragrance. By "solubilized in the fragrance", it is meant that the amount of monomer considered is fully solubilized in the fragrance, forming a monophasic, homogeneous and transparent phase.

General manufacturing process (alternative 1)

A 10 % polyvinyl alcohol) aqueous solution was prepared in advance by dissolving polyvinyl alcohol, hydrolyzed to 87-89 %, $M_w=85000-124000$ g/mol in water. An oil phase was prepared by first mixing the fragrance and the monomers to obtain a monophasic, homogeneous and transparent phase. The polymerization initiator was then added and the mixture was stirred until complete dissolution of the polymerization initiator. A dispersion of silica in water was prepared separately by stirring during 5 min the Aerosil R816 silica and the water with a pH between 6.5 and 8.5. The water dispersion contained sodium bicarbonate 100mg/L (to approximately have a pH in the range of 6.5 to 8.5). The oil phase and the dispersion of silica in water were stirred together at 7000 rpm for 2 min using a high-shear mixer (Ystral X 10/20 E3-1050 W equipped with a Dispermix head of diameter 40/54 mm). The mean particle and the span number of the resultant emulsion were determined according to the capsule particle size measurement method disclosed below. The emulsion was placed into a batch reactor equipped with a condenser, a
thermometer, a nitrogen inlet and an anchor stirrer. A known amount of 10 % polyvinyl alcohol) aqueous solution was added to get a total weight concentration of polyvinyl alcohol) in the water phase of 2 % and the mixture was stirred during 10 min. During all the process, the mixture was stirred at 250 rpm and nitrogen was bubbled through the mixture to remove oxygen. The temperature is first fixed at a temperature T1 during 30 min and the temperature is then increased to the temperature T2 within one hour. The mixture is kept at this temperature T2 during 3 hours. Finally, the resultant microcapsule dispersion was cooled to room temperature within 1 hour. The mean particle and the span number of the resultant microcapsule dispersion were determined according to the capsule particle size measurement method disclosed below.

General manufacturing process (alternative 2)
A 10 % polyvinyl alcohol) aqueous solution was prepared in advance by dissolving polyvinyl alcohol), hydrolyzed to 87-89 %, Mw=85000-124000 g/mol in water. An oil phase was prepared by mixing the fragrance and the monomers which are soluble in the fragrance except the monomer with hydroxyl groups. A monophasic, homogeneous and transparent phase was obtained. The polymerization initiator was then added and the mixture was stirred until complete dissolution of the polymerization initiator. This mixture was stirred until complete dissolution of the polymerization initiator. The water dispersion contained sodium bicarbonate 100mg/L (to approximately have a pH in the range of 6.5 to 8.5). In water were introduced in the following order: the monomers with hydroxyl groups and/or the neutral monomers that are not soluble in the fragrance, a 1 % solution of 3-(methacryloyloxy)propyltrimethylammonium chloride (MAPTAC, CAS 51410-72-1) in water and the Aerosil® 200 silica. The weight of the 1 % solution of MAPTAC in water represents between 0.5 % and 100 % of the weight of silica. The dispersion was stirred during 30 min. The water dispersion pH range was within a pH of 6.5 to 8.5. The oil phase and the dispersion of silica in water were stirred together at 7000 rpm for 2 min using a high-shear mixer (Ystral X 10/20 E3-1050 W equipped with a Dispermix head of diameter 40/54 mm). The mean particle and the span number of the resultant emulsion were determined according to the capsule particle size measurement method disclosed below. The emulsion was placed into a batch reactor equipped with a condenser, a thermometer, a nitrogen inlet and an anchor stirrer. A known amount of 10 % polyvinyl alcohol) aqueous solution was added to get a total weight concentration of polyvinyl alcohol) in the water phase of 2.6 % and the mixture was stirred during 10 min. If present, ionized monomers (which are not soluble in the fragrance) may be added at this stage. During all
the process, the mixture was stirred at 250 rpm and nitrogen was bubbled through the mixture to remove oxygen. The temperature is first fixed at a temperature T1 during 30 min and the temperature is then increased to the temperature T2 within one hour. The mixture is kept at this temperature T2 during 3 hours. Finally, the resultant microcapsule dispersion was cooled to room temperature within 1 hour. The mean particle and the span number of the resultant microcapsule dispersion were determined according to the capsule particle size measurement method disclosed below.

Capsule particle size measurement

Median volume diameter and span were measured with a laser diffraction/scattering particle size distribution analyzer (trade name: LA-950V2, manufactured by Horiba, Ltd.). The dispersant was 18 MΩ water. Several droplets of the emulsion or the capsule dispersion were poured into the flow cell unit until an acceptable level of laser light obscuration was achieved and triplicate measurements were then immediately performed. For the calculation of the particle size measurement, the refractive indexes were set at 1.33 (for the water dispersant), 1.47 (for the fragrances and the poly(methacrylate) capsules). The median capsule diameter was measured as a particle size of 50% frequency (median size) on a volumetric basis.

The span value is an indication of microcapsule size statistical dispersion. It is presently calculated according to the following formula:

\[
Span = \frac{\mathbb{E}(v;0.9) - \mathbb{P}(v;0.1)}{D(v;0.5)}
\]

in which \(D(v;0.9)\) is the particle size for 90% of the microcapsules by volume, \(D(v;0.1)\) is the particle size for 10% of the microcapsules by volume and \(D(v;0.5)\) is the median volume microcapsule size as previously defined.

The span ratio value is the ratio between the Span value of the aqueous dispersion and the Span value of the initial (oil-in-water) emulsion. It is presently calculated according to the following formula:

\[
Span\ ratio = \frac{Span\ Capsule}{Span\ Emulsion}
\]
wherein Span Capsule is the span as defined above of the aqueous microcapsule dispersion and the Span Emulsion is the span as defined above of the initial emulsion.

5 Since the particle size may be larger than 10 µm the analysis of the results by the Fraunhofer approximation (opaque particles, geometrical optic rules) is also relevant and lead valid size determination. In this case the refractive index is not necessary.

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<th>Composition of fragrance no. 1</th>
<th>(% by weight):</th>
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<td>10 Isobornyl acetate (CAS N° 125-12-2)</td>
<td>25</td>
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<td>Camphor gum powder synthetic (CAS N° 464-49-3)</td>
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<td>Lilial (CAS N° 80-54-6)</td>
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<td>Eucalyptol (CAS N° 470-82-6)</td>
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<td>Ethyl-2-methylpentanoate (CAS N° 39255-32-8)</td>
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<tr>
<td>15 Cedrol (CAS N° 77-53-2)</td>
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<td>20 Coumarin (CAS N° 91-64-5)</td>
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</tr>
<tr>
<td>Delta damascone (CAS N° 57378-68-4)</td>
<td>2</td>
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Example 1: Synthesis of the capsules according to the invention

The general manufacturing process was followed for to prepare microcapsule samples 1 and 2. A 10 % polyvinyl alcohol aqueous solution was prepared in advance by dissolving polyvinyl alcohol, hydrolyzed to 87-89 %, $M_w=85000$-124000 g/mol in water. An oil phase was prepared by mixing 1.23 g of benzoyl peroxide, 75% in water; 21.8 g of methacrylic acid; 8.7 g of methyl methacrylate; 24.0 g of 1,4-butanediol dimethacrylate; 150 g of fragrance no. 1. A monophasic, homogeneous and transparent phase was obtained. The polymerization initiator was then added and the mixture was stirred until complete dissolution of the polymerization initiator. A dispersion of silica in water was prepared separately by stirring during 5 min 1.20 g of Aerosil® R816 silica and water with a pH between 6.5 and 8.5. The water dispersion pH range was within a pH of 6.5 to 8.5. The oil phase and the dispersion of silica in water were stirred together at 7000 rpm for 2 min using a high-shear mixer (Ystral X 10/20 E3-1050 W equipped with a Dispermix head of
diameter 40/54 mm). The mean particle and the span number of the resultant emulsion were determined according to the capsule particle size measurement method disclosed below. 360 g of the emulsion were placed into a 500 mL-batch reactor equipped with a condenser, a thermometer, a nitrogen inlet and an anchor stirrer. A known amount of 10% polyvinyl alcohol) aqueous solution was added to get a total weight concentration of polyvinyl alcohol) in the water phase of 2% and the mixture was stirred during 10 min. During all the process, the mixture was stirred at 250 rpm and nitrogen was bubbled through the mixture to remove oxygen. The temperature is first fixed at 20°C during 30 min and the temperature is then increased to 80°C within one hour. The mixture is kept at this temperature of 80°C during 3 hours. Finally, the resultant microcapsule dispersion was cooled to room temperature within 1 hour. The mean particle and the span number of the resultant microcapsule dispersion were determined according to the capsule particle size measurement method disclosed below.

<table>
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<tr>
<th>Sample</th>
<th>Weight of water in the dispersion of silica (g)</th>
<th>Weight of 10% poly(vinyl alcohol) aqueous solution (g)</th>
<th>Concentration of fragrance in the final capsule dispersion (%)</th>
<th>Median volume diameter of the capsule dispersion (μm; D(ν, 0.5)); Span value</th>
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<tr>
<td>1</td>
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<td>36.5</td>
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<td>0.61</td>
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<td>0.75</td>
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Example 2: comparative examples (samples 3 and 4)
A 10% polyvinyl alcohol) aqueous solution was prepared in advance by dissolving polyvinyl alcohol), hydrolyzed to 87-89%, Mw=85000-124000 g/mol in water. An aqueous phase was prepared by mixing known amounts of 10% polyvinyl alcohol) aqueous solution and water with a pH range was within 6.5 to 8.5. An oil phase was prepared by mixing 1.23 g of benzoyl peroxide, 75% in water; 21.8 g of methacrylic acid; 8.7 g of methyl methacrylate; 24.0 g of 1,4-butane diol dimethacrylate; 150 g of fragrance no. 1. A monophasic, homogeneous and transparent phase was obtained. The polymerization initiator was then added and the mixture was stirred until complete dissolution of the polymerization initiator. The aqueous phase and the oil phase were placed into a 500 mL-batch reactor equipped with a condenser, a thermometer, a nitrogen inlet and a
deflocculating blade (diameter 4 cm). During all the process, the mixture was stirred at 900 rpm and nitrogen was bubbled through the mixture to remove oxygen. The temperature is first fixed at 20 °C during 30 min and the temperature is then increased to 80 °C within one hour. The mixture is kept at this temperature of 80 °C during 3 hours. Finally, the resultant microcapsule dispersion was cooled to room temperature within 1 hour. The mean particle and the span number of the resultant microcapsule dispersion were determined according to the capsule particle size measurement method disclosed below.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Weight of water in the dispersion of silica (g)</th>
<th>Concentration of fragrance in the final capsule dispersion (%)</th>
<th>Median volume diameter of the capsule dispersion (μm; D(v, 0.5)); Span value</th>
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<tr>
<td>3</td>
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<td>40.0</td>
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<td>1.20</td>
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</table>

Example 3 - Viscosity measurements

The viscosity measurement of the capsules dispersions were performed at 20 °C by using a Brookfield RVT Viscometer. Depending on the viscosity of the capsules dispersions, the measurements were performed with adapted rotational spindle and speeds.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Viscosity at 20 °C (cps)</th>
<th>Spindle and spindle speed</th>
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<tr>
<td>1</td>
<td>120</td>
<td>Spindle 1, 10 rpm</td>
</tr>
<tr>
<td>2</td>
<td>1500</td>
<td>Spindle 2, 10 rpm</td>
</tr>
<tr>
<td>3</td>
<td>6200</td>
<td>Spindle 4, 10 rpm</td>
</tr>
<tr>
<td>4</td>
<td>Paste (too viscous to be measured)</td>
<td>/</td>
</tr>
</tbody>
</table>

These results show that the viscosities of the samples of the present invention are much lower to the viscosities of the comparative examples with equivalent fragrance loading.
Sample 4 is no longer fluid (or mobile) and is thus not easy to handle.

This application is based on European Patent Application No. 13306096.2 filed on July 29, 2013, the entire subject matters of which are incorporated herein by reference. In addition, the subject matters of all documents cited in the specification are also incorporated herein by reference.

Industrial Applicability

The aqueous dispersion is suitable for inclusion into non-edible consumer goods products, laundry products, personal care products and cosmetic products. The aqueous dispersion can be obtained in an economic and efficient manner by polymerizing an emulsion so that emulsion droplets are finally encapsulated into polymeric shells.
CLAIMS

1. An aqueous dispersion including a plurality of microcapsules, each microcapsule comprising a perfume composition enclosed within a polymeric shell, wherein
   - the perfume composition includes a fragrance,
   - the polymeric shell includes solid colloidal particles having an average primary particle size comprised between 5nm and 1μm,
   - the polymeric shell further includes in polymerized form a monomer blend including:
     i) between 30% and 80% by weight over the combined weight of compounds (I) to (II) in the monomer blend of a compound (I) which is a monoethylenically unsaturated monomer and/or dimethyldiallyl ammonium chloride,
     ii) between 20% and 70% by weight over the combined weight of compounds (I) to (II) in the monomer blend of a compound (II) which is a polyethylenically unsaturated monomer,

   wherein the fragrance represents between 20% and 45% by weight over the weight of the aqueous dispersion.

2. The aqueous dispersion according to claim 1, wherein a monomer (I) having water solubility at 20°C greater than 20g/100ml is contained as the compound (I) and a monomer (II) having water solubility at 20°C greater than 20g/100ml is contained as the compound (II), and the monomer blend includes more than 15% by weight and less than 60% by weight over the weight of the monomer blend of the monomers (I) and (II).

3. The aqueous dispersion according to claim 1, wherein the compound (II) is a polyethylenically unsaturated monomer selected from the group consisting of a C₂-C₄ alkyl di- or polyester of (meth)acrylic acid, a C₂-C₄ alkyl di- or polyamide of (meth)acrylic acid and mixtures thereof, and the compound (II):
   A1. contains two or more (meth)acrylate ester groups or two or more (meth)acrylate amide groups per monomer, and
   B1. has a molecular weight which, once divided by the number of (meth)acrylate ester or amide groups, gives a value of more than 85 and lower than 135.

4. The aqueous dispersion according to any one of claims 1 to 3, wherein the
fragrance represents between 30% and 45% by weight over the weight of the aqueous dispersion.

5. The aqueous dispersion according to any one of claims 1 to 4, wherein the compound (I) is selected from (meth)acrylate monomers which are polymerizable through free-radical polymerization.

6. The aqueous dispersion according to any one of claims 1 to 5, wherein the compound (I) is selected from the group consisting of methacrylic acid, methyl methacrylate, ethyl methacrylate, isopropyl methacrylate, 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, 3-hydroxypropyl methacrylate and mixtures thereof.

7. The aqueous dispersion according to any one of claims 1 to 5, wherein the compound (I) is a combination of:

   ia) between 50% and 100% by weight over the weight of the combination of a neutral monomethacrylate monomer (la) having a solubility in water at pH 7 and 20°C equal to, or more of 2g/100ml,

   ib) between 0% and 50% by weight over the weight of the combination of another neutral monoethylenically unsaturated monomer (lb), and

   ic) between 0% and 15% by weight over the weight of the combination of a ionized or ionizable monoethylenically unsaturated monomer (lc).

8. The aqueous dispersion according to claim 7, wherein the neutral monomethacrylate monomer (la) is selected from the group consisting of 2-hydroxyethyl methacrylate, 2-hydroxypropyl methacrylate, 3-hydroxypropyl methacrylate, glycidyl methacrylate, poly(ethylene glycol) methyl ether methacrylate and mixtures thereof.

9. The aqueous dispersion according to any one of claims 1 to 8, wherein the compound (II) is a di- or polyester resulting from the esterification of (meth)acrylic acid with a linear or branched polyhydric C₂-C₄ alcohol and/or C₂-C₄ polyethylene glycols.

10. The aqueous dispersion according to claim 9, wherein the compound (II) comprises one or more of 1,4-butylene glycol dimethacrylate, ethylene glycol dimethacrylate and 1,3-propylene glycol dimethacrylate.
11. A product comprising the aqueous dispersion as defined in any one of claims 1 to 10, and which is a non-edible consumer goods product, a household cleaner or laundry product, a personal care product or a cosmetic product.

12. A process for the manufacture of the aqueous dispersion as defined in any one of claims 1 to 10, said process comprising the following steps:
   a) providing an oil-in-water emulsion having an oil phase and a water phase, said emulsion being obtainable by mixing:
      o colloidal particles having an average primary particle size comprised between 5nm and 1μm,
      o a polymerization initiator,
      o a perfume composition including a fragrance,
      o an emulsifier, and
      o the monomer blend as defined in any one of claims 1 to 10,
   b) triggering polymerization within the oil-in-water emulsion obtained in step a),
   c) letting the polymerization propagate thereby obtaining microcapsules;

13. Use of solid colloidal particles having an average primary particle size comprised between 5nm and 1μm to microencapsulate an oil-in-water emulsion, wherein the oil-in-water emulsion contains a fragrance in an amount comprised between 20% and 70% by weight of the weight of the oil-in-water emulsion.
A. CLASSIFICATION OF SUBJECT MATTER

INV. B01J13/14 C11D3/50
ADD.

According to International Patent Classification (IPC) and/or both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B01J C11D

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C.

See patent family annex.

Date of the actual completion of the international search

12 September 2014

Date of mailing of the international search report

23/09/2014

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Taral Io, Anthony
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