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(54) Title: COSMETIC PROCESS FOR MAKING UP THE EYES

(57) **Abstract**: The present invention relates to a cosmetic process for making up the eyes, comprising at least the steps consisting in: (i) forming, on all or part of the eyelashes, eyebrows and/or eyelids, an aerated coat of a composition (M) comprising, in a physiologically acceptable medium, at least one photo-crosslinkable compound, the said compound comprising at least one activated photo-dimerizable group bearing at least one activated double bond; and (ii) exposing all or part of the surface of the said coat formed in step (i) to conditions favourable for crosslinking the said photo-crosslinkable compound.

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“Cosmetic process for making up the eyes"

The present invention relates to a process for making up the eyes, in particular the eyelashes and the eyelids.

The term "making up the eyes" more particularly means making up the upper and lower eyelids, the inner edge of these eyelids, the eyelashes and the eyebrows.

Eye makeup products are generally of "mascara" type for the eyelashes; eyeliners or eyelid pencils.

In general, it is sought to obtain a volumizing effect, also known as a "swelling effect" for eye makeup, so as to emphasize the look and to make it more intense.

In the field of eyelash makeup highly concentrated mascara formulations with a high solids content have thus been proposed, making it possible to deposit a large thickness of material in order to obtain a volumizing or charging effect. The principle of these thickening mascaras is, in other words, to deposit the maximum amount of material on the eyelashes. However, such formulations have a very thick consistency and are therefore difficult to apply. The major drawback is the formation of "lumps", which are considered unsightly.

Still in the field of mascaras, very fluid formulations, conversely, have been proposed, which, by superposition of coats, also make it possible to obtain a volumizing effect. However, in this case also, the conditions for obtaining the volumizing effect are not entirely satisfactory since they are difficult and time-consuming to perform. In addition, the superposition of several coats of makeup composition on the eyelashes often leads to agglomeration of the eyelashes.

Finally, mention may be made of patent applications WO 2004/060 334, WO 2004/060 292 and US 2004/0 126 345, which propose, in order to impart a volumizing effect, the application to keratin fibres, in particular the hair, the eyelashes or the eyebrows, of a composition that forms a foam after application, which will be stabilized via the film formation of a film-forming polymer.

However, the coating thus formed is not entirely satisfactory in terms of resistance to rubbing, especially on contact with the fingers, or even resistance to water during bathing or showering, for example. The coating thus has poor staying power over time, which forces the user to freshen the application of the mascara.

As regards products of eyeliner or pencil type, they are in general used for the purposes of emphasizing the edges of the eyelids with a line, generally a dark line, in particular flush to the edge of the upper eyelashes.

It would be particularly advantageous to reinforce the emphasizing effect obtained.

The object of the present invention is, precisely, to satisfy the abovementioned expectations for improving the making up of the eyes.

More particularly, the invention is directed towards proposing a novel process for making up the eyes, in particular the eyelashes, making it possible to afford, in a single application, a particularly advantageous volumizing effect, without harming the coating properties of the makeup obtained, in terms of resistance to rubbing and staying power over time.

As emerges from the examples presented below, the inventors have discovered that it is possible to satisfy the abovementioned expectations by forming a coating in the form of a set foam via the use of specific photo-crosslinkable compounds.

Thus, according to a first of its aspects, the present invention relates to a cosmetic process for making up the eyes, comprising at least the steps consisting in:

(i) forming, on all or part of the eyelashes, eyebrows and/or eyelids, an aerated coat of a composition (M) comprising, in a physiologically acceptable medium, at least one photo-crosslinkable compound, the said compound comprising at least one activated photo-dimerizable group bearing at least one activated double bond; and

(ii) exposing all or part of the surface of the said coat formed in step (i) to conditions favourable for crosslinking the said photo-crosslinkable compound.

The term "physiologically acceptable medium" means a medium free of toxicity, which is compatible with application to human keratin materials, in particular the eyelashes, the eyebrows and the eyelids, and especially compatible with the region of the eyes.

In the text hereinbelow, the terms "eyelashes" and "eyebrows" include false eyelashes and hairpieces.

An "aerated" composition means a composition comprising a gaseous phase (for example air) in the form of bubbles. It is also known as a composition "in foam form".

The process of the invention proves to be advantageous in several respects.

Firstly, it makes it possible readily and quickly to produce thick, smooth coatings on the eyelashes, the eyebrows or the eyelids.

The coating formed may have a thickness of greater than or equal to 10 µm, in particular ranging from 10 µm to 5 mm, more particularly ranging from 50 µm to 2 mm and especially from 100 µm to 500 µm.

These coatings advantageously have good resistance to rubbing. They do not disintegrate, do not crumble and maintain good intensity of the colour of the original makeup. Thus, the coating formed is stable and long-lasting, in particular for at least 1 day and more particularly up to 3 days.

The process of the invention may be more particularly intended for making up the eyelashes.

The user may then obtain the desired volumizing effect on the eyelashes by a single application action, while at the same time obtaining separation of the eyelashes. The volumizing effect is manifested by a swelling effect on the coating of the eyelashes. In other words, the cross section of the coated eyelash increases in comparison with the cross section of the initial eyelash.

In particular, the coating formed on the surface of the eyelashes according to the process of the invention may have, after a single application of aerated composition, a thickness of greater than or equal to 50 µm, in particular ranging from 50 µm to 5 mm, more particularly from 100 µm to 2 mm and especially from 100 µm to 500 µm.

In the case of making up the eyelids, the process of the invention makes it possible to create marks or lines, in relief, with 3D effects, and thus proves to be particularly advantageous for bringing out the emphasizing effect, when compared with the makeup result obtained using conventional eyeliners or pencils.

The coating formed according to the process of the invention, on the surface of the eyelids, especially in the form of a line or a mark, may have, after a single application of aerated composition, a thickness of greater than or equal to 10 µm, in particular ranging from 10 µm to 2 mm and more particularly from 100 µm to 500 µm.

Other characteristics, variants and applications of the process according to the invention will emerge more clearly on reading the description and the examples that follow, which are given as non-limiting illustrations.

Unless otherwise indicated, the term "containing/comprising one" should be understood as meaning "containing/comprising at least one".

STEP (i): AERATED COAT

As mentioned previously, the process of the invention comprises the formation, on all or part of the eyelashes, the eyebrows and/or the eyelids, of an aerated coat of a composition, referred to hereinbelow as (M), comprising at least one photo-crosslinkable compound.

PHOTO-CROSSLINKABLE COMPOUND

The photo-crosslinkable compounds under consideration according to the invention comprise at least one activated photo-dimerizable group bearing at least one activated double bond.

According to a particular embodiment, the said photo-crosslinkable compound(s) may be present in the composition (M) in a proportion of from 1% to 50% by weight and in particular from 3% to 20% by weight relative to the total weight of the said composition.

The mean number of activated double bonds per molecule of compound is preferably greater than 1, in particular greater than 2 and better still greater than 3.

For the purposes of the present invention, the term "photo-dimerizable group" means a chemical group that leads to photo-dimerization reactions under irradiation.

For the purposes of the present invention, the term "photo-dimerization" means a chemical reaction between two double bonds (of 2+2 type) or two pairs of double bonds (of 4+4 type), and more particularly between two double bonds (of 2+2 type).

Thus, the double bond under consideration according to the invention, when it is photo-stimulated or, in other words, subjected to a specific radiation, generally UV, proves to be capable of reacting with another double bond by cyclization.

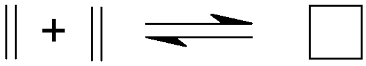
As detailed hereinbelow, the interacting double bonds are preferably ethylenic functions, i.e. of the type $CH_2=CH_2$.

For the purposes of the invention, the double bond under consideration is said to be activated. This characterization means that the double bond is spontaneously photo-dimerizable in response to a photo-stimulus, without requiring the mandatory presence of a photoinitiator or of a chemical initiator.

Consequently, a composition according to the invention is advantageously free of photoinitiator and/or of chemical initiator.

The activation of the double bond intended to become dimerized is commonly induced by the presence close thereto, generally in the alpha position, of an electron-withdrawing group, for instance an aromatic nucleus such as a phenyl.

The case of a reaction between two double bonds may be represented schematically in the following manner:



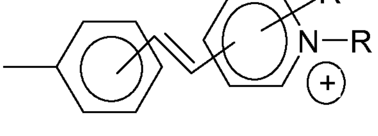
These photo-dimerization reactions are defined in the book *Advanced Organic Chemistry*, J. March, 4th edition, Wiley Interscience, NY 1992, p. 855.

The materials bearing photo-dimerizable groups according to the invention have the advantage of being stable towards oxygen, moisture and heat, and of leading to reversible crosslinking.

In addition, the photo-dimerizable groups according to the invention are highly photosensitive. Consequently, irradiation even of low energy leads to rapid and efficient crosslinking of the material, which, in the case of a cosmetic application, induces irradiation of short duration and of low energy, which does not cause any degradation of the keratin materials.

The activated photo-dimerizable groups that may be used according to the invention are chosen from:

a) photo-dimerizable groups bearing a stylbazolium function of formula (Ia) or (Ib):



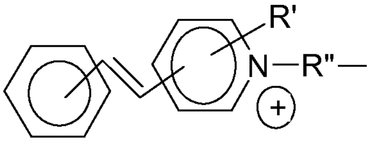
X^- (Ia)

in which

- R represents a hydrogen atom or a C_1-C_4 alkyl or C_1-C_4 hydroxyalkyl group, preferably R represents a hydrogen atom, a methyl group, an ethyl group or a hydroxyethyl group, and preferentially R is a methyl group;

- R’ represents a hydrogen atom or a C_1-C_4 alkyl group and preferably R' represents a hydrogen atom; and

- X^- denotes an ion chosen from chloride, bromide, iodide, perchlorate, tetrafluoroborate, methyl sulfate, phosphate, sulfate, methanesulfonate and p-toluenesulfonate ions, preferably X^- is an ion chosen from chloride and methyl sulfate ions, and preferentially X^- is a methyl sulfate ion.



X^- (Ib)

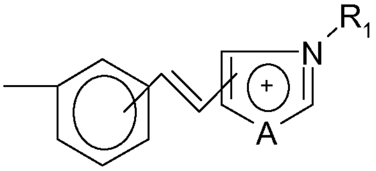
in which

- R’’ denotes an alkylene radical (divalent) containing from 2 to 8 carbon atoms, and preferably R’’ denotes an alkylene radical (divalent) containing from 2 to 4 carbon atoms;

- R’ represents a hydrogen atom or a C_1-C_4 alkyl group, preferably with R' representing a hydrogen atom; and

- X^- having the same meaning as that described for the preceding formula (Ia).

b) photo-dimerizable groups bearing a styrylazolium function of formula (II):



X^- (II)

in which:

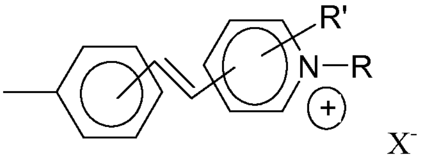
- R_1 denotes a hydrogen atom or a C_1-C_4 alkyl or C_1-C_4 hydroxyalkyl group;

- A denotes a sulfur atom, an oxygen atom or a group NR’ or $C(R')_2$, R’; with R’ representing a hydrogen atom or a C_1-C_4 alkyl group, R’ preferably representing a hydrogen atom; and

- X^- having the same meaning as that described for the preceding formula (Ia).

Such chemical groups bear activated double bonds, and as such the photo-dimerization of these double bonds is triggered spontaneously in the UVA range, without requiring a photoinitiator.

According to a preferred embodiment, the photo-dimerizable groups that may be used according to the invention bear a stylbazolium function of formula (Ia):



(Ia)

in which

- R represents a hydrogen atom or a C_1-C_4 alkyl or C_1-C_4 hydroxyalkyl group,
- R' represents a hydrogen atom or a C_1-C_4 alkyl group, and
- X^- denotes an ion chosen from chloride, bromide, iodide, perchlorate, tetrafluoroborate, methyl sulfate, phosphate, sulfate, methanesulfonate and p-toluenesulfonate ions.

The photo-crosslinkable compound is derived from the functionalization of a natural backbone, which is preferably polymeric, with at least one photo-dimerizable group.

This functionalization falls within the competence of a person skilled in the art.

Advantageously, in the compositions of the invention, the compound comprising at least one photo-dimerizable group is a hydrocarbon-based polymer chosen from polyvinyl alcohol, partially or totally hydrolysed polyvinyl acetate and polysaccharides chosen from chondroitin sulfate, keratan, keratan sulfate, heparin, heparin sulfate, xanthan, carrageenan, chitosan, cellulose and derivatives thereof, alginate, starch, dextran, pullulan and galactomannan, and biologically acceptable salts thereof.

According to a particularly preferred embodiment of the invention, the photo-crosslinkable compound according to the invention may bear one or more function(s) that can be cyclized in a 2/2 reaction, which are sensitive to light irradiation, in particular in the absence of photoinitiator and/or of chemical initiator.

Preferably, a photo-crosslinkable compound comprises at least one photo-dimerizable unit bearing a photo-dimerizable activated double bond, borne by a polymer of partially or totally hydrolysed polyvinyl acetate type, a polysaccharide or a polyvinyl alcohol.

As regards the compounds containing photo-dimerizable groups bearing a stylbazolium function, they are obtained by reacting the polymer under consideration with a chemical species comprising a group of formula (Ia) or (Ib).

Preferably, the chemical species comprising a group (Ia) bears a reactive group W of aldehyde or acetal type.

In other words, this chemical species corresponds to the general formula W-A, with A denoting the group (Ia).

As chemical species that may be used for grafting groups of styrylpyridinium type, mention may be made especially of quaternary salts of 2-(4-formylstyryl)pyridinium, 4-(4-formylstyryl)pyridinium, 2-(3-formylstyryl)pyridinium, N-methyl-2-(4-formylstyryl)pyridinium, N-methyl-3-(4-formylstyryl)pyridinium, N-methyl-2-(3-formylstyryl)pyridinium, N-methyl-2-(2-formylstyryl)pyridinium, N-ethyl-2-(4-formylstyryl)pyridinium, N-(2-hydroxyethyl)-2-(4-formylstyryl)pyridinium, N-(2-hydroxyethyl)-4-(4-formylstyryl)pyridinium, N-methyl-4-(4-formylstyryl)pyridinium or N-methyl-4-(3-formylstyryl)pyridinium.

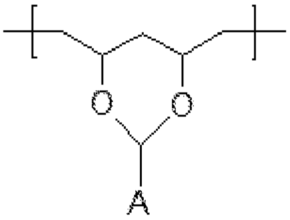
The quaternary pyridinium salts may be chloride, bromide, iodide, perchlorate, tetrafluoroborate, methosulfate, phosphate, sulfate, methanesulfonate or p-toluenesulfonate salts. Such chemical species are described in GB-A-2 030 575.

Examples of species that may be mentioned include 4-(4-formylphenylethenyl)-1-methylpyridiunium methosulfate, 1-(3-ethoxycarbonylmethyl)-4-[2-(4-formylphenyl)ethenyl]pyridinium bromide and 1-(methoxycarbonylpropyl)-4-[2-(4-formylphenyl)ethenyl]pyridinium bromide. Such species are described in US 2007/0 112 094.

Use is preferably made of n-methyl-4-(4-formylstyryl)pyridinium methyl sulfate (RN= 74401-04-0), sold especially by the company Wako.

Advantageously, the chemical species of formula W-A react with a polymer of polyvinyl alcohol or polyvinyl acetal type as described in the documents mentioned previously.

For example, a polyvinyl alcohol-grafted polymer comprising units having the following structure is thus obtained:



Polyvinyl alcohol polymers grafted with styrylpyridinium groups are especially described in the publication Ichimura K et al., Preparation and characteristics of photo-crosslinkable poly(vinyl alcohol), *Journal of Polymer Science*, polymer chemistry edition, Vol 20, 1419-1432 (1982).

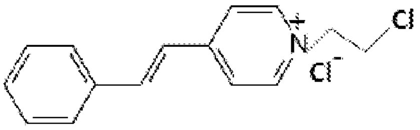
The polymers may be obtained by reaction of polyvinyl alcohol or partially hydrolysed polyvinyl acetate with styrylpyridinium salts bearing a formyl or acetal group as described in GB-A-2 030 575, WO 96/29312, US 5 061 603, GB-A-2 076 826 and EP-A-092 901.

Cellulose polymers grafted with styrylpyridinium groups are especially described in US 2007/0 112 094.

Preferably, the chemical species bearing a group (Ia) bears a reactive group which is a chlorine atom.

In this variant, the chemical species corresponds to a general formula Cl-A', with A' denoting the group (Ia).

As chemical species of the type Cl-A', use is preferably made of that of formula:



corresponding to the chloro compound (1) described in the preparation examples hereinbelow.

Advantageously, the photo-crosslinkable compound comprising the groups (Ib) is advantageously obtained by reaction of the species Cl-A' with the polysaccharide chosen from those defined previously, in the presence of water.

For their part, the compounds containing photo-dimerizable groups bearing a styrylazolium function are obtained by reaction of the polymer with a chemical species comprising a group of formula (II).

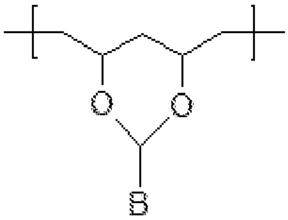
Preferably, the chemical species comprising a group (II) bears a reactive group W of aldehyde or acetal type.

In other words, the chemical species corresponds to a general formula W-B, with B denoting the group (II).

As chemical species that may be used for grafting groups of styrylazolium type, mention may be made of those described in EP-A-313 220.

Advantageously, these chemical species of formula W-B react with a polymer of polyvinyl alcohol or polyvinyl acetal type as described in the documents mentioned previously.

A polyvinyl alcohol-grafted polymer comprising units having the following structure is thus obtained:

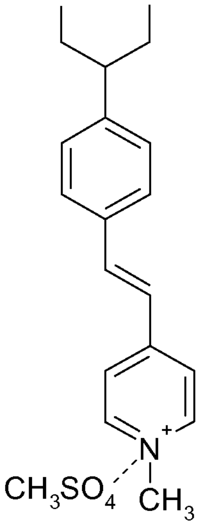


Polyvinyl alcohol polymers grafted with a styrylazolium group are especially described in EP-A-313 220. In this document, these polymers may be obtained by reaction of polyvinyl alcohol or partially hydrolysed polyvinyl acetate with styrylazolium salts bearing an aldehyde or acetal group.

Preferably, the polymer bearing photo-dimerizable group(s) is in the form of particles, in particular dispersed particles.

Thus, in the latter case, the polymer particles are very preferentially polyvinyl alcohol particles.

Thus, according to one embodiment variant, the photo-crosslinkable compound is a polyvinyl alcohol (PVA) partly functionalized with one or more hydroxyl functions and one or more functions of formula (III):

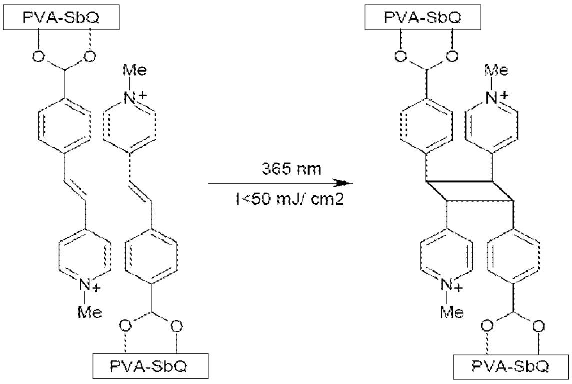


(III)

The degree of polymerization of the polyvinyl alcohol may be between 100 and 5000.

Advantageously, the polymer has a degree of substitution, as a percentage of functions of formula (Ia), (Ib) or (II) as defined above, which may be between 0.1 and 25.

The following scheme represents a variant in which the polymer is PVA-SbQ (polymer of polyvinyl alcohol PVA type bearing a few hydrolysed functions and a few functions grafted with stylbazolium species), which is capable of crosslinking under the effect of light, as illustrated below.



These materials are particularly appreciated since they do not require photoinitiator and react toward visible light or toward radiation which may comprise both UV light and visible light, in particular a low dose of UV.

By way of example, mention may be made of PVA-SbQ (poly(vinyl alcohol) with N-methylstyrylpyridinium side groups in the form of the methyl sulfate salt), sold under the reference MQ2012 by the company Murakami, especially in the form of a dispersion at 13.3% by weight in water, for example of CAS No:107845-59-0.

According to another embodiment variant, the photo-crosslinkable compound is featured by a polysaccharide that is functionalized with photo-dimerizable groups.

It may especially be a polysaccharide that may be chosen especially from chondroitin sulfate, keratan, keratan sulfate, heparin, heparin sulfate, xanthan, carrageenan, chitosan, cellulose and derivatives thereof, alginate, starch, dextran, pullulan and galactomannan, and biologically acceptable salts thereof.

The degree of functionalization is obviously adjusted so as to be able to impart the required degree of crosslinking during step (ii) of the process of the invention.

According to the invention, the degree of functionalization with photo-dimerizable units is at least 0.1%, or even at least 0.5%, or even at least 2%.

As stated previously, in a composition according to the invention, the photo-dimerizable groups are preferably borne by a polymer of polyvinyl acetate type, a polyvinyl alcohol or a polysaccharide.

Preferably, in a composition according to the invention, the photo-dimerizable groups are borne by a polyvinyl alcohol.

The photo-crosslinkable compound may be conveyed in a physiologically acceptable medium and in particular an aqueous medium or even pure water.

The photo-crosslinkable compound may have a number-average molecular weight ranging from 2000 to 100 000 and preferably ranging from 2000 to 20 000.

According to another particular embodiment, the photo-crosslinkable compound may be chosen from polyurethane and/or polyurea polymers or oligomers bearing (meth)acrylate groups, in particular polyurethane (meth)acrylate oligomers.

Such polyurethanes/polyureas bearing acrylate groups are sold, for example, under the name Ebecryl® by the company Cytec (Ebecryl® 210: molar mass 1500, 2 acrylate functions per molecule, Ebecryl® 230: molar mass 5000, 2 acrylate functions per molecule, Ebecryl® 270: molar mass 1500, 2 acrylate functions per molecule, Ebecryl® 8402: molar mass 1000, 2 acrylate functions per molecule, Ebecryl® 8804: molar mass 1300, 2 acrylate functions per molecule, Ebecryl® 220: molar mass 1000, 6 acrylate functions per molecule, Ebecryl® 1290: molar mass 1000).

Mention may also be made of the water-soluble aliphatic acrylate polyurethanes sold under the names Ucecoat® 6558 and Ucecoat® 6569, and the acrylate polyurethanes in aqueous dispersion sold under the trade names Ucecoat® 7571, Ucecoat® 7578, Ucecoat® 7655, Ucecoat® 7674, Ucecoat® 7689 and Ucecoat® 7699 by the company Cytec.

These compounds are capable of crosslinking when they are subjected to radiation comprising at least UV light.

An example that may be mentioned is diurethane methacrylate (INCI: Di-HEMA trimethylhexyl dicarbamate).

The composition may contain a single photo-crosslinkable polymer bearing functions of identical or different nature.

It is also possible to use a mixture of photo-crosslinkable polymers bearing different functions.

Consequently, the reactions may be performed between two photo-dimerizable groups of identical or different chemical nature.

The activated double bonds may react with another double bond of the same chemical nature or react with another double bond of different chemical nature.

Preferably, the photo-crosslinkable compound under consideration according to the invention is chosen from polymers that are capable of photo-crosslinking via a 2+2 cycloaddition reaction, in particular polymers bearing stylbazolium functions.

Characteristics of the aerated coat

According to a particular embodiment, the said aerated coat formed in step (i) has a degree of aeration of greater than or equal to 10% and preferably less than 1000%.

The degree of aeration may range, for example, from 20% to 500% and preferably from 50% to 300%.

The degree of aeration corresponds to the amount of gas incorporated into the composition.

The degree of aeration is measured according to the following protocol: prior to the measurement, a quantity Q of composition to be characterized is placed in a transparent container bearing graduations indicating the volume, before aeration, and the volume $V_{\text{before aeration}}$ (in cm^3) is measured (in practice, the quantity is such that $V_{\text{before aeration}}$

is of the order of 10 cm^3) at a room temperature of 23°C and at atmospheric pressure. In practice also, provision is made, in order to measure the volume, to tap the quantity Q in the bottom of the container, gently enough so as not to cause appreciable expansion of the product. The quantity Q of composition is then left alone for about 10 minutes in order for it to aerate by itself, naturally. The new volume V_{foam} of the composition in foam form is then measured. If need be, the top of the foam is levelled off somewhat in order to give it a flat surface. In this way, it is easier to evaluate the volume.

As detailed hereinbelow, the aeration may result from expansion of the composition with delayed expansion or may be created via an aerated-composition distributor.

The degree of aeration is then calculated with the aid of the following formula:

$$\text{degree of aeration} = [(V_{foam} - V_{\text{before aeration}})/V_{\text{before aeration}}] \times 100$$

FORMATION OF THE AERATED COAT

According to a first variant of the process of the invention, the composition in foam form is created *in situ* on the eyelashes, eyebrows and/or eyelids, after application of a composition with delayed expansion (E).

A composition with delayed expansion is a system comprising a "self-foaming" agent which is capable of enabling expansion of the said composition to give it the form of a foam, generally by release or formation of a volatile agent in the composition after it has been applied to the eyelashes, eyebrows or eyelids.

Thus, according to a particular embodiment, the said aerated coat is formed via at least the steps consisting in:

(a) applying to all or part of the eyelashes, eyebrows and/or eyelids at least a one coat of a composition with delayed expansion, denoted (E), comprising at least one photo-crosslinkable compound as defined previously and at least one self-foaming compound, and

(b) exposing all or part of the said coat from step (a) to conditions favourable for expanding the said composition.

In this embodiment, the second crosslinking step is delayed until the transformation of the coat with delayed expansion into an aerated coat.

The term "self-foaming agent" means a compound that is capable of imparting to a composition the form of a foam with an acceptable degree of aeration.

This variant is particularly advantageous insofar as it does not require, unlike compositions conditioned in foam form, the spreading of a foam in order to form the aerated coat, which may often prove to be difficult for forming a uniform coating.

In the context of making up the eyelashes, this variant proves to be particularly advantageous for obtaining good visibility of the eyelashes while at the same time maintaining separation of the eyelashes.

According to another of its aspects, the present invention relates to a cosmetic composition with delayed expansion comprising, in a physiologically acceptable medium,

- at least one photo-crosslinkable compound as defined previously; and
- at least one self-foaming compound.

The composition with delayed expansion may be applied to the surface of the eyelashes, eyebrows and/or eyelids with any applicator usually used for applying standard cosmetic compositions.

These applicators are well known to those skilled in the art. Needless to say, it falls within the knowledge of a person skilled in the art to adapt the characteristics of the dispenser with regard especially to the nature of the self-foaming compound used and the targeted application.

For example, eyelash makeup compositions may be applied using a makeup brush as described, for example, in patents FR 2 701 198, FR 2 605 505, EP 792 603 and EP 663 161.

The said composition may be conditioned, for example, in a standard aerosol device, with a separation such as a piston or a flexible bag to separate the self-foaming compound from the propellant required for expelling the composition. It may also be a flexible tube, a pump bottle or a bottle with a deformable wall.

The composition dispenser may be advantageously combined with an application means or applicator, especially in the form of a brush comprising an arrangement of bristles maintained by a twisted wire. Such a twisted brush is described especially in patent US 4 887 622. It may also be in the form of a comb comprising a plurality of application elements. Such combs are described, for example, in patent FR 2 796 529. The applicator may be integrally attached to the container, as described, for example, in patent FR 2 761 959. Advantageously, the applicator is integrally attached to a stem, which, itself, is integrally attached to the closing member.

The said self-foaming compound(s) may be chosen from the agents known to those skilled in the art, provided that they are capable of giving the composition the form of a foam with an acceptable degree of aeration, and of doing so under conditions that are compatible with application to the eyelashes, the eyebrows and/or the eyelids.

These self-foaming compounds may be chosen, for example, from:

- slow-expanding systems.

The self-foaming agent may be chosen, for example, from volatile hydrocarbons and volatile halogenated hydrocarbons with a boiling point low enough to enable them to evaporate and to foam the composition after application to the eyelashes, the eyebrows or the eyelids, and a boiling point that is high enough to prevent premature foaming.

The boiling point of the self-foaming agent preferably ranges from -20 to 40°C.

The self-foaming agent is preferably chosen from linear or branched C_4-C_6 aliphatic hydrocarbons.

Preferably, it is chosen from n-pentane, isopentane, neopentane, n-butane, isobutane and isohexane, and mixtures thereof; and more preferentially isopentane.

- gas-releasing systems

These may be systems that release CO_2 by acidification of a carbonate, as described, for example, in patent application EP 1 133 983; or of aqueous hydrogen peroxide solution made unstable by basification or addition of a compound which promotes the dismutation of water.

- heat-foaming or heat-expandable systems

These may be "heat-expandable" particles, which are capable of expanding under the action of a temperature of greater than or equal to 45°C. They are preferably thermoplastic particles, which are capable of deforming under the action of heat and of conserving their new shape, including after cooling, especially to room temperature.

Examples that may be mentioned are the particles sold under the name Expancel® by the company Akzo Nobel.

According to a particular embodiment, the said self-foaming compound is chosen from slow-expanding systems, in particular as described previously.

According to a particularly preferred embodiment, it is isopentane, or alternatively an isopentane/isobutane mixture especially in a weight ratio ranging from 1/1 to 3/1.

The said composition advantageously has a degree of expansion ranging from 10% to 5000%.

The term "degree of expansion" means the ratio between the volume occupied by the composition measured 15 minutes after its application, divided by the volume occupied by the composition measured immediately after its application.

A person skilled in the art is capable of using the said self-foaming agent(s) in an adequate amount for obtaining the desired degree of expansion.

In particular, the said self-foaming agent(s) may be present in the composition with delayed expansion in a content ranging from 0.1% to 10% by weight relative to the total weight of the said composition.

A person skilled in the art is capable of using the conditions of exposure of the said coating formed in step (a) to obtain the desired expansion of the said composition.

Depending on the nature of the self-foaming agent used, the expanded composition may be obtained, for example, after exposure to atmospheric pressure and/or to a shear and/or to a temperature above room temperature.

In particular, in the context of using a self-foaming compound of volatile hydrocarbon type as described previously, step (b) may consist simply in leaving the said coating formed in step (a) to expand in the ambient atmosphere, especially for a time ranging from 10 seconds to 5 minutes.

According to a particular embodiment, the process of the invention also comprises the application, prior to, simultaneously with or subsequent to the application in step (a) of the said composition with delayed expansion (E) and prior to step (b), of at least one conventional cosmetic composition, for example a conventional mascara when the process is intended for making up the eyelashes, or a conventional eyeliner when the process is intended for making up the eyelids.

The compositions may also be mixed on the application surface itself so as to create partial or total homogenization.

This particular mode may make it possible, for example, advantageously to combine the cosmetic properties intrinsic to conventional mascaras or eyeliners, and the properties, in particular in terms of volumizing effect and good staying power, made possible by the application of the composition with delayed expansion according to the process of the invention.

According to yet another particular embodiment, in the context of making up the eyelids or the eyebrows, a mould may be applied, simultaneously with the expansion (b) of the said composition, the mould being such that it makes it possible to define a specific volume above the application surface.

The mould may be made, for example, of plastic, for instance of polyethylene, polystyrene or of fluorinated material, for example of polytetrafluoroethylene (PTFE).

The application of a mould advantageously makes it possible to control the expansion of the composition, in particular the volume and shape of the aerated coat that will be formed on the surface of the eyelids or the eyebrows, and thus makes it possible to obtain a very smooth coating with very good homogeneity.

According to a second variant of the process of the invention, in particular in the context of making up the eyebrows and the eyelids, the foam appearance is generated at the time of dispensing the composition onto the eyelashes, eyebrows or eyelids.

More particularly, the said aerated coat of step (i) of the process of the invention may be formed, simultaneously with its application to the surface of the eyelashes, eyebrows or eyelids, using a non-aerated base composition comprising the said photo-crosslinkable compound, and with the aid of an aerated-composition dispenser that can dispense the base composition in the form of an aerated composition.

As mentioned previously, according to one of its aspects, the invention relates to a product for forming an aerated cosmetic composition, comprising:

(a) a non-aerated base composition comprising, in a physiologically acceptable medium, at least one photo-crosslinkable compound as defined previously; and

(b) an aerated-composition dispenser for dispensing the said base composition in the form of an aerated composition.

The aerated composition may be formed from the base composition and air or an inert gas.

The base composition which serves to obtain the aerated composition has a similar composition to the aerated composition except for its higher density in so far as it is free of air or inert gas.

These aerated-composition dispensers are well known in the cosmetics field.

Such a dispenser comprises at least:

- a reservoir containing the base composition, and
- a dispensing head for dispensing the aerated composition.

This dispenser may be an aerosol, comprising, besides the base composition, a propellant gas.

The propellant gas that may be used may be chosen from carbon dioxide, nitrogen, nitrous oxide, volatile hydrocarbons such as butane, isobutane, propane, ethane, pentane, isododecane or isohexadecane, and mixtures thereof.

Alternatively, the dispenser may contain no propellant gas. In this case, the base composition may be in an aerated-composition dispenser comprising a dispensing head for dispensing the aerated composition, a pump and a dip tube for transferring the composition from the container into the head to dispense the aerated composition. The aerated composition is formed by forcing the base composition to pass through a material comprising a porous substance such as a sintered material, a plastic or metal filtering grille, or similar structures.

PHYSIOLOGICALLY ACCEPTABLE MEDIUM

According to a particular embodiment, the composition of the invention is of mascara type.

It may be, for example, in the form of a wax-in-water emulsion. These mascaras have advantageous cosmetic properties in terms of lengthening or curling or alternatively in terms of comfort on application.

It may also be in the form of an eyelash gel.

According to another particular embodiment, the composition of the invention is of eyeliner type. The eyeliner may be in the form of a pencil and kohl, as a felt or a brush.

In all cases, the composition according to the invention may be prepared according to methods known to those skilled in the art. Needless to say, the process for preparing the compositions according to the invention depends on the desired type of formulation: mascara, eyeliner, etc.

Aqueous phase

The composition may comprise at least one aqueous phase.

The aqueous phase (water and optionally the water-miscible solvent) may be present in a content ranging from 5% to 95% by weight, preferably from 10% to 85% by weight and better still from 2% to 80% by weight relative to the total weight of the composition.

The continuous aqueous phase may consist essentially of water; it may also comprise a mixture of water and of water-miscible solvent (miscibility in water of greater than 50% by weight at 25°C), such as lower monoalcohols containing from 1 to 5 carbon atoms such as ethanol and isopropanol, glycols containing from 2 to 8 carbon atoms such as propylene glycol, ethylene glycol, 1,3-butylene glycol and dipropylene glycol, C_3-C_4 ketones and C_2-C_4 aldehydes, and mixtures thereof.

Liquid fatty phase

The composition according to the invention may comprise a liquid fatty phase.

For the purposes of the application, the term "liquid fatty phase" means a fatty phase that is liquid at room temperature (25°C) and atmospheric pressure (760 mmHg), composed of one or more non-aqueous fatty substances that are liquid at room temperature, also known as oils or organic solvents.

The oil may be chosen from volatile oils and/or non-volatile oils, and mixtures thereof.

The oil(s) may be present in a content ranging from 0.5% to 90% by weight, preferably from 5% to 80% by weight, better still from 10% to 60% by weight and even better still from 20% to 55% by weight relative to the total weight of the composition.

For the purposes of the invention, the term "volatile oil" means an oil that is capable of evaporating on contact with the eyelashes, eyebrows or eyelids, in less than one hour, at room temperature and atmospheric pressure. The volatile organic solvent(s) and the volatile oils of the invention are volatile cosmetic organic solvents and oils, which are liquid at room temperature, having a non-zero vapour pressure, at room temperature and atmospheric pressure, in particular ranging from 0.13 Pa to 40 000 Pa (10^{-3} to 300 mmHg), in particular ranging from 1.3 Pa to 13 000 Pa (0.01 to 100 mmHg) and more particularly ranging from 1.3 Pa to 1300 Pa (0.01 to 10 mmHg).

In particular, the volatile oils are chosen from oils with an evaporation rate of greater than or equal to 0.002 mg/cm^2/minute. The evaporation rate is measured as follows:

15 g of oil or of the mixture of oils to be tested are introduced into a crystallizing dish (diameter: 7 cm) placed on a balance located in a chamber of about 0.3 m^3 with a regulated temperature (25°C) and hygrometry (50% relative humidity).

The liquid is allowed to evaporate freely, without stirring, ventilation being provided by means of a ventilator (Papst-Motoren, reference 8550 N operating at 2700 rpm and of dimensions 80×80×42 mm, for example the reference 8550 N from Papst-Motoren, the flow rate corresponds to about 50 m^3/hour) arranged vertically above the crystallizing dish containing the solvent, the vanes being directed towards the crystallizing dish and 20 cm away from the base of the crystallizing dish.

The mass of oil remaining in the crystallizing dish is measured at regular intervals. The evaporation rates are expressed as mg of oil evaporated per unit of surface area (cm^2) and per unit of time (minutes).

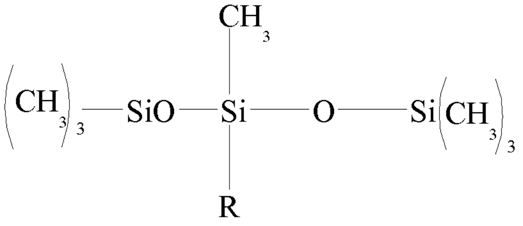
The term "non-volatile oil" means an oil which remains on the eyelashes, eyebrows or eyelids, at room temperature and atmospheric pressure, for at least several hours and which especially has a vapour pressure of less than 10^{-3} mmHg (0.13 Pa).

These oils may be hydrocarbon-based oils, silicone oils or fluoro oils, or mixtures thereof.

The term "hydrocarbon-based oil" means an oil mainly containing hydrogen and carbon atoms and optionally oxygen, nitrogen, sulfur or phosphorus atoms. The volatile hydrocarbon-based oils may be chosen from hydrocarbon-based oils containing from 8 to 16 carbon atoms, and especially branched C_8-C_{16} alkanes such as C_8-C_{16} isoalkanes of petroleum origin (also known as isoparaffins), for instance isododecane (also known as 2,2,4,4,6-pentamethylheptane), isodecane or isohexadecane, and, for example, the oils sold under the names Isopar or Permethyl, branched C_8-C_{16} esters, and isohexyl neopentanoate, and mixtures thereof. Other volatile hydrocarbon-based oils such as petroleum distillates, especially those sold under the name Shell Solt by the company Shell, may also be used. Preferably, the volatile solvent is chosen from volatile hydrocarbon-based oils containing from 8 to 16 carbon atoms, and mixtures thereof.

Volatile oils that may also be used include volatile silicones, for instance volatile linear or cyclic silicone oils, especially those with a viscosity ≤ 8 centistokes (8×10^{-6} m^2/s), and especially containing from 2 to 7 silicon atoms, these silicones optionally comprising alkyl or alkoxy groups containing from 1 to 10 carbon atoms. As volatile silicone oils that may be used in the invention, mention may be made especially of octamethylcyclotetrasiloxane, decamethylcyclopentasiloxane, dodecamethylcyclohexasiloxane, heptamethylhexyltrisiloxane, heptamethyloctyltrisiloxane, hexamethyldisiloxane, octamethyltrisiloxane, decamethyltetrasiloxane and dodecamethylpentasiloxane, and mixtures thereof.

Mention may also be made of the volatile linear alkyltrisiloxane oils of general formula (I):



$$(CH_3)_3SiO-\overset{CH_3}{\underset{R}{Si}}-O-Si(CH_3)_3$$

where R represents an alkyl group comprising from 2 to 4 carbon atoms, one or more hydrogen atoms of which can be replaced by a fluorine or chlorine atom.

Mention may be made, among the oils of general formula (I), of:

3-butyl-1,1,1,3,5,5,5-heptamethyltrisiloxane,

3-propyl-1,1,1,3,5,5,5-heptamethyltrisiloxane, and

3-ethyl-1,1,1,3,5,5,5-heptamethyltrisiloxane,

corresponding to the oils of formula (I) for which R is, respectively, a butyl group, a propyl group or an ethyl group.

Volatile fluoro solvents such as nonafluoromethoxybutane or perfluoromethylcyclopentane may also be used.

The composition may also comprise at least one non-volatile oil, chosen especially from non-volatile hydrocarbon-based and/or silicone and/or fluoro oils.

Non-volatile hydrocarbon-based oils that may especially be mentioned include:

- hydrocarbon-based oils of plant origin, such as fatty acid triesters, the fatty acids of which may have varied chain lengths from C_4 to C_{24}, these chains possibly being linear or branched, and saturated or unsaturated; these oils are especially wheatgerm oil, sunflower oil, grapeseed oil, sesame seed oil, corn oil, apricot oil, castor oil, shea oil, avocado oil, olive oil, soybean oil, sweet almond oil, palm oil, rapeseed oil, cottonseed oil, hazelnut oil, macadamia oil, jojoba oil, alfalfa oil, poppy oil, pumpkin oil, sesame seed oil, marrow oil, blackcurrant oil, evening primrose oil, millet oil, barley oil, quinoa oil, rye oil, safflower oil, candlenut oil, passion flower oil and musk rose oil; or alternatively caprylic/capric acid triglycerides such as those sold by the company Stéarineries Dubois or those sold under the names Miglyol 810, 812 and 818 by the company Dynamit Nobel;

- synthetic ethers containing from 10 to 40 carbon atoms;
- linear or branched hydrocarbons of mineral or synthetic origin, such as petroleum jelly, polydecenes, hydrogenated polyisobutene such as parleam, and squalane, and mixtures thereof;
- synthetic esters such as oils of formula R_1COOR_2 in which R_1 represents a linear or branched fatty acid residue containing from 1 to 40 carbon atoms and R_2 represents an in particular branched hydrocarbon-based chain containing from 1 to 40 carbon atoms, on condition that $R_1 + R_2 \geq 10$, for instance purcellin oil (cetostearyl octanoate), isopropyl myristate, isopropyl palmitate, C_{12}-C_{15} alkyl benzoate, hexyl laurate, diisopropyl adipate, isononyl isononanoate, 2-ethylhexyl palmitate, isostearyl isostearate, alkyl or polyalkyl octanoates, decanoates or ricinoleates such as propylene glycol dioctanoate; hydroxylated esters such as isostearyl lactate and diisostearyl malate; and pentaerythritol esters;
- fatty alcohols that are liquid at room temperature, containing a branched and/or unsaturated carbon-based chain containing from 12 to 26 carbon atoms, for instance octyldodecanol, isostearyl alcohol, oleyl alcohol, 2-hexyldecanol, 2-butyloctanol or 2-undecylpentadecanol;
- higher fatty acids such as oleic acid, linoleic acid or linolenic acid;
- carbonates;
- acetals;
- citrates;
- and mixtures thereof.

According to a particular embodiment, the composition according to the invention comprises at least one non-volatile hydrocarbon-based oil with a molecular mass of greater than 500 g/mol, preferably greater than 600 g/mol and better still greater than 650 g/mol, but not exceeding 15 000 g/mol, preferably not exceeding 10 000 g/mol and better still not exceeding 7500 g/mol.

The refractive index is preferably greater than 1.44 at 20°C (the refractive index being measured with a refractometer), advantageously greater than 1.450 and better still greater than 1.460.

The term "hydrocarbon-based" compound means a compound mainly comprising carbon and hydrogen atoms and optionally one or more functions chosen from hydroxyl, ester, ether and carboxylic functions. These compounds are in particular free of -Si-O- groups.

This non-volatile hydrocarbon-based oil may be chosen from:

- lipophilic polymers such as:
  - polybutenes such as Indopol H-100 (molar mass or MM = 920 g/mol), Indopol H-300 (MM = 1340 g/mol), Indopol H-1500 (MM = 2160 g/mol) sold or manufactured by the company Innovene,
  - hydrogenated polyisobutylenes such as Panalane H-300 E sold or manufactured by the company Amoco (M = 1340 g/mol, refractive index of 1.498), Viseal 20000 sold or manufactured by the company Synteal (MM = 6000 g/mol) and Rewopal PIB 1000 sold or manufactured by the company Witco (MM = 1000 g/mol),
  - polydecenes and hydrogenated polydecenes such as Puresyn 10 (MM = 723 g/mol) and Puresyn 150 (MM = 9200 g/mol) sold or manufactured by the company Mobil Chemicals,
- esters such as
  - linear fatty acid esters with a total carbon number ranging from 30 to 70, such as pentaerythrityl tetrapelargonate (MM = 697.05 g/mol),
  - hydroxylated esters such as diisostearyl malate (MM = 639 g/mol, refractive index of 1.462),
  - aromatic esters such as tridecyl trimellitate (MM = 757.19 g/mol),
  - esters of branched C_{24}-C_{28} fatty alcohols or fatty acids such as those described in patent application EP-A-0 955 039, and especially triisocetyl citrate (MM = 865 g/mol), pentaerythrityl tetraisononanoate (MM = 697.05 g/mol), glyceryl

triisostearate (MM = 891.51 g/mol), glyceryl tris(2-decyl)tetradecanoate (MM = 1143.98 g/mol), pentaerythrityl tetraisostearate (MM = 1202.02 g/mol), poly-2-glyceryl tetraisostearate (MM = 1232.04 g/mol) or pentaerythrityl tetrakis(2-decyl)tetradecanoate (MM = 1538.66 g/mol),

- oils of plant origin such as sesame oil (820.6 g/mol),
- and mixtures thereof.

Preferably, the non-volatile hydrocarbon-based oil is chosen from polybutenes.

The non-volatile hydrocarbon-based oil may represent from 0.5% to 40% by weight, preferably from 1% to 30% and better still from 5% to 20% by weight relative to the total weight of the composition.

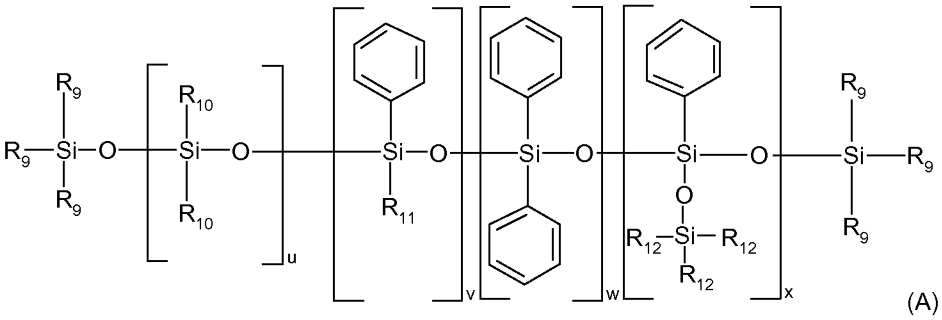
The non-volatile silicone oils that may be used in the composition according to the invention may be non-volatile polydimethylsiloxanes (PDMS), polydimethylsiloxanes comprising alkyl or alkoxy groups, which are pendent and/or at the end of a silicone chain, these groups each containing from 2 to 24 carbon atoms, phenyl silicones such as phenyl trimethicones, phenyl dimethicones, phenyltrimethylsiloxydiphenylsiloxanes, diphenyl dimethicones, diphenylmethyldiphenyltrisiloxanes and 2-phenylethyl trimethylsiloxysilicates.

The fluoro oils that may be used in the invention are especially fluorosilicone oils, fluoro polyethers and fluoro silicones as described in document EP-A-0 847 752.

According to an advantageous embodiment, the composition comprises at least one non-volatile silicone oil and preferably a phenyl silicone oil.

The phenyl silicone oils that may be used according to the present invention have a viscosity, measured at 25°C and atmospheric pressure, ranging from 5 to 100 000 cSt and preferably from 5 to 10 000 cSt.

The silicone oil may be, for example, a phenyl trimethicone, a phenyl dimethicone, a phenyltrimethylsiloxydiphenylsiloxane, a diphenyl dimethicone, a diphenylmethyldiphenyltrisiloxane or a mixture of different phenyl silicone oils, and in particular may correspond to formula (A) below:



(A)

in which:

- R_9 and R_{12} are each independently a C_1-C_{30} alkyl radical, an aryl radical or an aralkyl radical,

- R_{10} and R_{11} are each independently a C_1-C_{30} alkyl radical or an aralkyl radical, and

- u, v, w and x are each independently integers ranging from 0 to 900,

with the proviso that the sum v+w+x is other than 0 and that the sum u+v+w+x ranges from 1 to 900, in particular, u+v+w+x ranges from 1 to 800.

Advantageously, R_9 is a C_1-C_{20} alkyl radical, a phenyl radical or an aralkyl radical of the type R'-C_6H_5, R' being a C_1-C_5 alkyl, R_{10} and R_{11} are each independently a C_1-C_{20} alkyl radical or an aralkyl radical of the type R'-C_6H_5, R' being a C_1-C_5 alkyl, and R_{12} is a C_1-C_{20} alkyl radical.

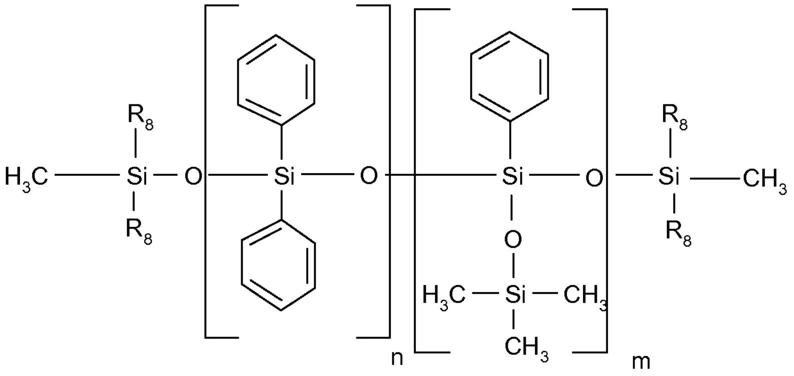
Preferably, R_9 is a methyl, ethyl, propyl, isopropyl, decyl, dodecyl or octadecyl radical, or alternatively a phenyl, tolyl, benzyl or phenethyl radical, R_{10} and R_{11} are each independently a methyl, ethyl, propyl, isopropyl, decyl, dodecyl or octadecyl radical or alternatively a tolyl, benzyl or phenethyl radical, and R_{12} is a methyl, ethyl, propyl, isopropyl, decyl, dodecyl or octadecyl radical.

According to a particular embodiment of the invention, the composition contains a phenyl silicone oil with a viscosity of less than 500 cSt at 25°C, known as a "low-viscosity phenyl silicone oil", and a phenyl silicone oil with a viscosity at least equal to 500 cSt at 25°C, known as a "high-viscosity phenyl silicone oil". Advantageously, the low-viscosity phenyl silicone oil has a viscosity at 25°C ranging, for example, from 5 to 499 cSt, preferably from 5 to 300 cSt and better still from 5 to 100 cSt, and the high-viscosity phenyl silicone oil has a viscosity at 25°C ranging, for example, from 500 to 10 000 cSt, preferably from 600 to 5000 cSt and better still from 600 to 3000 cSt.

The use of phenyl silicone oils of low and high viscosities as defined above makes it possible to obtain, after deposition onto the eyelashes, a film of composition that is particularly glossy and uniform, and of good staying power.

Preferably, these phenyl silicone oils of low and high viscosities satisfy formula (A). Preferably, the first low-viscosity phenyl silicone oil satisfies formula (A) with the sum u+v+w+x ranging from 1 to 150 and better still from 1 to 100, or even from 1 to 50, and the second high-viscosity phenyl silicone oil satisfies formula (A) with the sum u+v+w+x ranging from 151 to 900 and better still from 160 to 800, or even from 160 to 500.

In particular, the low-viscosity phenyl silicone oil satisfies formula (III) below:



(III)

in which:

- R_8 is a C_1-C_{30} alkyl radical, an aryl radical or an aralkyl radical,
- n is an integer ranging from 0 to 100 and better still less than 100, and
- m is an integer ranging from 0 to 100, with the proviso that the sum m+n ranges from 1 to 100, and better still is less than 100.

Advantageously, R_8 is a C_1-C_{20} alkyl radical, a phenyl radical or an aralkyl radical of the type R’-C_6H_5, R’ being a C_1-C_5 alkyl.

Preferably, R_8 is a methyl, ethyl, propyl, isopropyl, decyl, dodecyl or octadecyl radical or alternatively a phenyl, tolyl, benzyl or phenethyl radical. Advantageously, R_8 is a methyl radical.

Among the low-viscosity phenyl silicone oils that may be used in the invention, mention may be made of the oils DC556 (22.5 cSt) and SF558 (10-20 cSt) from

Dow Corning, the oil Abil AV8853 (4-6 cSt) from Goldschmidt, the oil Silbione 70 633 V 30 (28 cSt) from Rhône-Poulenc, the oils 15 M 40 (50 to 100 cSt), 15 M 50 (20 to 25 cSt) from PCR, the oils SF 1550 (25 cSt) and PK 20 (20 cSt) from Bayer, the oil Belsil PDM 200 (200 cSt) from Wacker, and the oils KF 53 (175 cSt), KF 54 (400 cSt) and KF 56 (14 cSt) from Shin-Etsu.

Among the high-viscosity phenyl silicone oils that may be used in the invention, mention may be made of the oils 15 M 30 from PCR (500 cSt) or Belsil PDM 1000 (1000 cSt) from Wacker.

The values in parentheses represent viscosities at 25°C.

The weight ratio between the low-viscosity phenyl silicone oil and the high-viscosity phenyl silicone oil may range, for example, from 70/30 to 30/70 and better still from 60/40 to 40/60.

According to one embodiment, the composition used in the process according to the invention is anhydrous.

The term "anhydrous" means a composition comprising less than 5% by weight of water and preferably less than 3% by weight of water relative to the total weight of the composition, and better still free of water.

Film-forming polymer

A composition according to the invention may also comprise one or more film-forming polymers, other than the (photo)crosslinkable polymers under consideration according to the invention and described previously.

For the purposes of the present invention, the term "film-forming polymer" denotes a polymer that is capable of forming, by itself or in the presence of an auxiliary film-forming agent, an isolable film, which is especially continuous and adherent, on a support, especially on the eyelashes or the skin.

This film-forming polymer may be chosen from the group consisting of synthetic polymers, of radical type or of polycondensate type, and polymers of natural origin, and mixtures thereof.

A film-forming polymer that is suitable for use in the invention may be chosen in particular from:

- polysaccharide derivatives, such as cellulose or guar gum derivatives. A polysaccharide derivative that is suitable for use in the invention may be a polysaccharide ester or alkyl ether.

The term "polysaccharide ester or alkyl ether" denotes a polysaccharide formed from repeating units comprising at least two identical or different rings having a degree of substitution per saccharide unit of between 1.9 and 3, preferably between 2.2 and 2.9 and more particularly between 2.4 and 2.8. The term "substitution" denotes the functionalization of the hydroxyl groups into ester and/or alkyl ether functions, and/or the functionalization of the carboxylic groups into ester functions.

In other words, it may be a polysaccharide that is partially or totally substituted with ester and/or alkyl ether groups. Preferably, the hydroxyl groups may be substituted with ester and/or C_2-C_4 alkyl ether functions.

Mention may be made in particular of cellulose esters, such as cellulose acetate, cellulose acetobutyrates or cellulose acetopropionates; cellulose alkyl ethers such as ethylcelluloses, and ethyl guars;

- synthetic polymers such as polyurethanes, acrylic polymers, vinyl polymers, polyvinyl butyrals, alkyd resins and ketone/aldehyde resins, resins derived from aldehyde condensation products, such as arylsulfonamide-formaldehyde resins, for instance toluenesulfonamide-formaldehyde resin, arylsulfonamide-epoxy resins or ethyl tosylamide resins;

- polymers of natural origin, such as plant resins, such as dammar resins, elemi gums, copal resins, and benzoin; gums such as shellac, sandarac gum and mastic gum.

According to a particular embodiment, the composition under consideration according to the invention comprises a total content of film-forming polymer of between 1% and 60% by weight, especially between 2% and 30% by weight and in particular between 5% and 15% by weight relative to the total weight of the said composition.

Preferably, it is an aqueous dispersion of particles of at least one film-forming polymer. These solid particles may be of anionic, cationic or neutral nature.

A dispersion that is suitable for use in the invention may comprise one or more types of particle, these particles possibly varying in their size, their structure and/or their chemical nature.

The size of the polymer particles in aqueous dispersion may range from 5 to 500 nm and is in particular from 10 to 150 nm. However, particles with a size ranging up to 1 micron may be used.

The size of the particles may be measured, for example, with a machine of the Brookhaven BI-90 type via the light scattering technique, or with a particle size analyser of the Malvern Mastersizer 2000 type, or alternatively by electron microscopy.

The compositions according to the invention may comprise a plasticizer that promotes the formation of a film with the film-forming polymer. Such a plasticizer may be chosen from any compound known to those skilled in the art as being capable of satisfying the desired function.

Particulate phase

The composition according to the invention preferably comprises a particulate phase, in particular comprising solid particles chosen from waxes, fillers, pigments and nacres.

The composition may comprise from 1% to 50% by weight and preferably from 4% to 20% by weight of solid particles relative to the total weight of the said composition.

The waxes and fillers advantageously make it possible to adjust the fluidity and viscosity of the composition, in order to give it advantageous makeup properties, especially good coating of the eyelashes.

Waxes

The wax may be present in the composition in a content ranging from 0.1% to 50% by weight, preferably ranging from 1% to 25% by weight and preferentially ranging from 5% to 15% by weight relative to the total weight of the composition.

According to a preferred embodiment, the weight content of pigments, nacres and fillers may be greater than the weight content of waxes.

Within the meaning of the present invention, the term “wax” is understood to mean a lipophilic compound, which is solid at room temperature (25°C), with a reversible solid/liquid change of state, which has a melting point of greater than or equal to 30°C, which may be up to 120°C.

The melting point of the wax may be measured using a differential scanning calorimeter (DSC), for example the calorimeter sold under the name DSC 30 by the company Mettler.

The waxes may be hydrocarbon-based waxes, fluoro waxes and/or silicone waxes, and may be of plant, mineral, animal and/or synthetic origin. In particular, the waxes have a melting point of greater than 25°C and better still greater than 45°C.

Hydrocarbon-based waxes, for instance beeswax, lanolin wax or Chinese insect wax; rice wax, carnauba wax, candelilla wax, ouricury wax, esparto grass wax, cork fibre wax, sugar cane wax, Japan wax and sumach wax; montan wax, microcrystalline waxes, paraffins and ozokerite; polyethylene waxes, the waxes obtained by Fischer-Tropsch synthesis and waxy copolymers, and also esters thereof, may especially be used.

Mention may also be made of waxes obtained by catalytic hydrogenation of animal or plant oils containing linear or branched C8-C32 fatty chains.

Among these waxes that may especially be mentioned are hydrogenated jojoba oil, isomerized jojoba oil such as the trans-isomerized partially hydrogenated jojoba oil manufactured or sold by the company Desert Whale under the commercial reference Iso-Jojoba-50®, hydrogenated sunflower oil, hydrogenated castor oil, hydrogenated coconut oil, hydrogenated lanolin oil and bis(1,1,1-trimethylolpropane) tetrastearate sold under the name Hest 2T-4S by the company Heterene, bis(1,1,1-trimethylolpropane) tetrabehenate sold under the name Hest 2T-4B by the company Heterene.

Mention may also be made of silicone waxes, for instance alkyl or alkoxy dimethicones containing from 16 to 45 carbon atoms, and fluoro waxes.

The wax obtained by hydrogenation of olive oil esterified with stearyl alcohol, sold under the name Phytowax Olive 18L57 or else the waxes obtained by hydrogenation of castor oil esterified with cetyl alcohol sold under the names Phytowax ricin 16L64 and 22L73 by the company Sophim may also be used. Such waxes are described in patent application FR-A-2 792 190.

The composition may comprise at least one polar wax.

The term "polar wax" means waxes comprising in their chemical structure, in addition to carbon and hydrogen atoms, at least one highly electronegative heteroatom, such as O, N or P.

Preferably, the wax is chosen from carnauba wax, candelilla wax, natural (or blanched) beeswax and synthetic beeswax. A synthetic beeswax that may be mentioned is the wax sold under the name Cyclochem 326 A by Evonik Goldschmidt (INCI name: Synthetic Beeswax).

The composition may comprise at least one wax having a hardness ranging from 0.05 MPa to 15 MPa and preferably ranging from 6 MPa to 15 MPa.

The hardness is determined by measuring the compression force, measured at 20°C using the texturometer sold under the name TA-TX2i by the company Rheo, equipped with a stainless-steel cylindrical spindle 2 mm in diameter, travelling at a measuring speed of 0.1 mm/second, and penetrating the wax to a penetration depth of 0.3 mm.

Fillers

The fillers may be present in the composition in a content ranging from 0.01% to 50% by weight, preferably ranging from 0.1% to 30% by weight, for example ranging from 1% to 25% by weight, for example ranging from 5% to 20% by weight, relative to the total weight of the composition.

The term “fillers” should be understood as meaning colourless or white, mineral or synthetic particles of any shape, which are insoluble in the medium of the composition, irrespective of the temperature at which the composition is manufactured. These fillers serve especially to modify the rheology or the texture of the composition.

The fillers may be mineral or organic and of any shape, platelet-shaped, spherical or oblong, irrespective of the crystallographic form (for example lamellar, cubic, hexagonal, orthorhombic, etc.).

Mention may be made especially of mica, kaolin, poly-β-alanine powder and polyethylene powder, powders of tetrafluoroethylene polymers (Teflon®), lauroyllysine, starch, boron nitride, hollow polymer microspheres such as those of polyvinylidene chloride/acrylonitrile, for instance Expancel® (Nobel Industrie) or of acrylic acid copolymers (Polytrap® from the company Dow Corning) and silicone resin microbeads (for example Tospearls® from Toshiba), elastomeric polyorganosiloxane particles, precipitated calcium carbonate, magnesium carbonate, magnesium hydrogen carbonate, hydroxyapatite, hollow silica microspheres (Silica Beads® from Maprecos), glass or ceramic microcapsules, and metal soaps derived from organic carboxylic acids containing from 8 to 22 carbon atoms and preferably from 12 to 18 carbon atoms, for example zinc stearate, magnesium stearate or lithium stearate, zinc laurate or magnesium myristate.

They may especially be chosen, preferably, from talc, silica, rice starch, polyamide (Nylon®) powders and polymethyl methacrylate powders, especially those sold under the name Covabead® LH85 by the company LCW.

Pigments and nacres

The pigments and nacres may be present in the composition in a content ranging from 0.01% to 50% by weight, for example ranging from 0.1% to 30% by weight, for example ranging from 1% to 20% by weight, for example ranging from 3% to 10% by weight, relative to the total weight of the composition.

The pigments may be white or coloured, mineral and/or organic, and coated or uncoated.

Among the mineral pigments, mention may be made of titanium dioxide, optionally surface-treated, zirconium oxide, zinc oxide or cerium oxide, and also iron oxide or chromium oxide, manganese violet, ultramarine blue, chromium hydrate and ferric blue.

Among the organic pigments, mention may be made of carbon black, pigments of D&C type, and lakes based on cochineal carmine or on barium, strontium, calcium or aluminium.

The terms "nacres" and "nacreous pigments" should be understood as meaning iridescent or non-iridescent coloured particles of any shape, especially produced by certain molluscs in their shell or alternatively synthesized, and which have a colour effect via optical interference.

The nacres may be chosen from white nacreous pigments such as mica coated with titanium or with bismuth oxychloride, coloured nacreous pigments such as titanium mica with iron oxides, titanium mica especially with ferric blue or with chromium oxide, titanium mica with an organic pigment of the abovementioned type, and also nacreous pigments based on bismuth oxychloride.

According to a particular mode, the iron oxides will be present in a content ranging from 0.01% to 15% by weight and preferably from 0.01% to 10% by weight relative to the total weight of the said composition.

Additives

The composition of the invention may also comprise any additive usually used in cosmetics.

Needless to say, a person skilled in the art will take care to select the optional additional cosmetic additives, and/or the amount thereof, such that the advantageous properties of the composition according to the invention are not, or are not substantially, adversely affected by the envisaged addition.

As illustrations of these additives, mention may be made especially of antioxidants, preserving agents, fragrances, neutralizers, thickeners, vitamins, surfactants and fibres, and mixtures thereof.

The term "fibre" should be understood as meaning an object of length L and of diameter D such that L is greater than D and preferably very much greater than D, D being the diameter of the circle in which the cross section of the fibre is inscribed. In particular, the ratio L/D (or aspect ratio) is chosen in the range from 3.5 to 2500, preferably from 5 to 500 and better still from 5 to 150.

The fibres that may be used in the composition of the invention may be mineral or organic fibres, of synthetic or natural origin. They may be short or long, individual or organized, for example braided, and hollow or solid. They may have any shape and may especially have a circular or polygonal (square, hexagonal or octagonal) cross section depending on the specific application envisaged. In particular, their ends are blunted and/or polished to prevent injury.

In particular, the fibres have a length ranging from 1 μm to 10 mm, preferably from 0.1 mm to 5 mm and better still from 0.3 mm to 3 mm. Their cross section may be included in a circle with a diameter ranging from 2 nm to 500 μm, preferably ranging from 100 nm to 100 μm and better still from 1 μm to 50 μm. The weight or yarn count of fibres is often given in denier or decitex and represents the weight in grams per 9 km of yarn. Preferably, the fibres according to the invention have a yarn count chosen in the range from 0.01 to 10 denier, preferably from 0.1 to 2 denier and better still from 0.3 to 0.7 denier.

The fibres that may be used in the compositions according to the invention may be chosen from rigid or non-rigid fibres, and may be of synthetic or natural, mineral or organic origin.

Moreover, the fibres may or may not be surface-treated, may be coated or uncoated, and may be coloured or uncoloured.

As fibres that may be used in the compositions according to the invention, mention may be made of non-rigid fibres such as polyamide (Nylon®) fibres or rigid fibres such as polyimideamide fibres, for instance those sold under the names Kermel® and Kermel Tech® by the company Rhodia or poly(p-phenyleneterephthalamide) (or aramid) fibres sold especially under the name Kevlar® by the company DuPont de Nemours.

The fibres may be present in a content ranging from 0.01% to 10% by weight, in particular from 0.1% to 5% by weight and more particularly from 0.3% to 3% by weight relative to the total weight of the composition.

The compositions in accordance with the invention may also comprise at least one dyestuff chosen from liposoluble dyes and water-soluble dyes.

The liposoluble dyes are, for example, Sudan Red, D&C Red 17, D&C Green 6, β-carotene, soybean oil, Sudan Brown, D&C Yellow 11, D&C Violet 2, D&C Orange 5, quinoline yellow and annatto.

Needless to say, a person skilled in the art will take care to select this or these optional additional compound(s), and/or the amount thereof, such that the advantageous properties of the composition for the use according to the invention are not, or are not substantially, adversely affected by the envisaged addition.

Preferably, the composition under consideration according to the invention is free of photoinitiator and/or of chemical initiator.

For the purposes of the present invention, the term "photoinitiator" means a compound which initiates the photo-dimerization reaction and releases a radical under irradiation, especially in the UV range.

As representatives of conventional photoinitiators, which are therefore not required according to the invention, mention may be made especially of thioxanthone, rose Bengal, phloxin, eosin, erythrosin, fluorescein, acriflavin, thionine, riboflavin, proflavin, chlorophylls, haematoporphyrin and methylene blue, and mixtures thereof, this list not being limiting.

STEP (ii): CROSSLINKING

According to a particular embodiment, especially in the context of making up the eyelids, step (ii) may be preceded by a step of smoothing the said coat of composition (M). This step may be performed, for example, using a mould to be applied onto the surface of the coat so as to give it a shape, or alternatively via a system for levelling or for removing the surplus foam, by scraping.

Such a step advantageously makes it possible to improve the smooth and uniform appearance of the coating formed.

As mentioned previously, the process of the invention comprises at least one step (ii) of exposing all or part of the surface of the said aerated coat formed in step (i) to conditions suitable for crosslinking the said photo-crosslinkable compound.

It falls to a person skilled in the art to select the adequate exposure conditions, especially with regard to the nature of the photo-crosslinkable compound used in the composition.

Step (ii) may consist in illuminating the surface of the said coat with ambient light or with a source of artificial light.

The ambient or artificial light may emit radiation in the visible and/or UV range. Preferably, it emits at least a proportion of radiation in the UV range, for example a proportion of UV of at least 2% of the total light energy of the ambient light.

According to a particular embodiment, step (ii) comprises, or even consists in, illuminating the surface of the said coat with ambient light, in particular for a time of at least 1 minute.

The time of exposure to the ambient light may more particularly range from 10 seconds to 15 minutes and especially from 5 to 10 minutes.

According to another particular embodiment, step (ii) comprises, or even consists in, illuminating the surface of the said coat with a source of artificial light.

The time of exposure to the said artificial light may range from 10 seconds to 10 minutes and in particular from 30 seconds to 5 minutes.

The lighting system for providing artificial light may consist, for example, of lighting with a lamp, a torch, a laser or LEDs, for example in the form of an LED array.

The artificial light source may emit radiation in the visible range and/or radiation in the UV range.

The emitted light may or may not be monochromatic. The wavelength of the emitted light is preferably centred on 365 nm, in particular between 400 nm and 700 nm and better still between 365 nm and 550 nm.

The crosslinking may be initiated by illumination without the need for a photoinitiator.

Preferably, it will be a source of artificial light emitting energy of at least 0.2 mW/cm^2 and in particular from 0.5 to 20 mW/cm^2.

The crosslinking may take place with a reduced light intensity, and the lighting system may, for example, produce a light intensity of less than 50 mJ/cm^2 or even 10 J/cm^2.

In particular, the light energy in the UV range is preferably less than 10 J/cm^2.

The twofold characteristic of the absence of photoinitiator and of relatively weak light intensity is particularly advantageous since it makes it possible to limit the harmful effects of aggressive initiators or of prolonged exposure to intense light, in particular in UV wavelengths.

A person skilled in the art will be capable of adapting the illumination characteristics, especially in terms of duration of exposure and of radiation wavelengths, with regard to the nature of the photo-crosslinkable compound used.

Thus, the photo-crosslinking of polyurethanes bearing (meth)acrylate groups will require light emitting at least radiation in the UV range, whereas the photo-crosslinking of polymers of PVA-SbQ type may be performed with radiation in the visible range.

Other variants of the process of the invention, in the case of the use of a composition with delayed expansion, are described below.

Thus, according to a first embodiment variant, step (ii) may be performed, on all or part of the surface of the said coat, before the complete expansion of the composition with delayed expansion (E).

It is thus possible to stop the expansion of the composition when the coat has reached the desired thickness.

According to yet another variant, it is possible to perform heterogeneous illumination of the coat formed.

Thus, according to a particular embodiment, the process of the invention may comprise at least one step of illumination, as described previously, of one or more localized zones of the surface of the said coat of composition with delayed expansion (E), before the complete expansion of the said composition (E), or even immediately after its application (a) and prior to its expansion (b).

The said zones may be defined, for example, using a cache that can permit the illumination only of the said zone(s).

In particular, the process may comprise at least two illumination steps performed for different localized zones of the surface of the said coat of composition with delayed expansion (E), and when the said composition has reached different degrees of aeration.

It is thus possible to obtain varying volume effects by creating more or less thick coating zones.

This variant is particularly advantageous in the case of using a composition of eyeliner type, for creating a makeup mark that has novel relief effects.

The process of the invention may also comprise one or more subsequent steps of superposition onto the coating formed after step (ii) of one or more additional coats of standard composition(s), in particular of conventional mascaras or eyeliners.

The present invention will be understood more clearly by means of the examples that follow.

These examples are presented as illustrations of the invention and cannot be interpreted as limiting the scope thereof.

EXAMPLES

EXAMPLE 1

Mascara

Preparation of the composition

Phases 1 and 2 described in Table 1 below are mixed together in the following weight proportions:

phase A: 97.25%

phase B: 2.75%

TABLE 1

Compounds	**Commercial references**	**Amount (mass%)**
PHASE A		
Myristic acid	98% myristic acid pastilles from Stéarineries Dubois	2.5
Stearic acid	Stearine TP 1200 Pastilles (DUB 50P) from Stéarineries Dubois	1
Cetyl alcohol	Lanette 16 from Cognis (BASF)	1
Aminomethylpropanediol	AMPD Ultra PC from Dow Chemical	0.5
Hydrogenated PEG-40 castor oil	Eumulgin HRE 40 from Cognis (BASF)	0.5
Cyclopentasiloxane (and) dimethiconol	Xiameter PMX-1501 Fluid from Dow Corning	3
Xanthan gum	Keltrol CG from CP Kelco	0.5
Styrene/acrylates/ammonium methacrylate (and) sodium laureth sulfate (and) caprylyl glycol copolymer	Syntran 5760 CG from Interpolymer	15
PVA SbQ (Poly(vinyl alcohol) with N-methylstyrylpyridium side groups, in the form of the methyl sulfate salt at 13.3% by weight in water)	MQ2012 by the company Murakami	35.3
Carnauba wax	Cerauba T1 from Baerlocher	2
Black 2 (and) laureth-21	WD-CB2 from Daito Kasei Kogyo	6
Preserving agents		0.7
Deionized water		32
Total		**100**
PHASE B		
Isopentane (75%) (and) isobutane (25%)	Novaspray IP/IBU (75/25) from Inventec	**100**

Application to the eyelashes

The composition is applied to the eyelashes using a mascara brush. The coating is left in ambient light for 3 minutes.

Result

A coating about 200 µm thick is obtained.

After 10 minutes, the eyelashes can be touched with the fingers, without affecting the appearance, in particular the volume, of the coating formed.

EXAMPLE 2

Eyeliner

Preparation of the composition

Phases 1 and 2 described in Table 1 below are mixed together in the following weight proportions:

phase A: 97.25%

phase B: 2.75%

TABLE 2

Compounds /Commercial References	**Amount (mass%)**
Phase A	
Styrene/acrylates/ammonium methacrylate (and) sodium laureth-12 sulfate copolymer	28
PPG-2 butyl ether	2
Dispersion of Black 2 (and) laureth-21 in water	24
PVA SbQ (Poly(vinyl alcohol) with N-methylstyrylpyridium side groups, in the form of the methyl sulfate salt, sold under the reference MQ2012 by the company Murakami at 13.3% by weight in water)	36.6
Black 2 (and) laureth-21	6
Preserving agents	3
Hydroxyethylcellulose	0.4
Total	100
Phase B	
Isopentane (75%) and isobutane (25%)	100

CLAIMS

1. Cosmetic process for making up the eyes, comprising at least the steps consisting in:

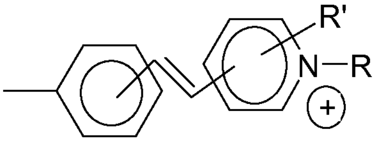
(i) forming, on all or part of the eyelashes, eyebrows and/or eyelids, an aerated coat of a composition comprising, in a physiologically acceptable medium, at least one photo-crosslinkable compound, the said compound comprising at least one activated photo-dimerizable group bearing at least one activated double bond; and

(ii) exposing all or part of the surface of the said coat formed in step (i) to conditions favourable for crosslinking the said photo-crosslinkable compound.

2. Process according to Claim 1, in which the said photo-crosslinkable compound bears one or more functions that can be cyclized via a 2/2 reaction, which are sensitive to light irradiation in the absence of photoinitiator and/or of chemical initiator.

3. Process according to Claim 1 or 2, in which the said activated photo-dimerizable group is chosen from:

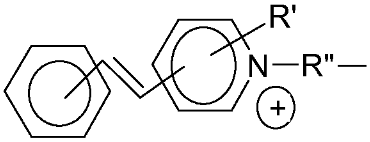
a) photo-dimerizable groups bearing a stylbazolium function of formula (Ia) or (Ib):



X$^-$ (Ia)

in which

- R represents a hydrogen atom or a C_1-C_4 alkyl or C_1-C_4 hydroxyalkyl group,
- R' represents a hydrogen atom or a C_1-C_4 alkyl group, and
- X$^-$ denotes an ion chosen from chloride, bromide, iodide, perchlorate, tetrafluoroborate, methyl sulfate, phosphate, sulfate, methanesulfonate and p-toluenesulfonate ions,



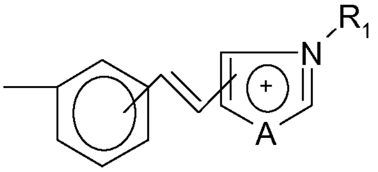
X$^-$ (Ib)

in which

- R'' denotes a divalent alkylene radical containing from 2 to 8 carbon atoms,

- R' represents a hydrogen atom or a C_1-C_4 alkyl group, and
- X^- having the same meaning as that described for the preceding formula (Ia), and/or

b) photo-dimerizable groups bearing a styrylazolium function of formula (II):

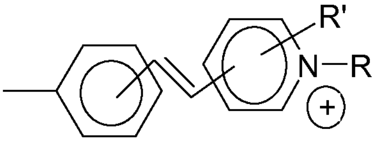


X^- (II)

in which:

- R_1 denotes a hydrogen atom or a C_1-C_4 alkyl or C_1-C_4 hydroxyalkyl group,
- A denotes a sulfur atom, an oxygen atom or a group NR' or C(R')$_2$, R', with R' representing a hydrogen atom or a C_1-C_4 alkyl group, and
- X^- having the same meaning as that described for the preceding formula (Ia).

4. Process according to any one of the preceding claims, in which the photo-dimerizable group is a photo-dimerizable group bearing a stylbazolium function of formula (Ia):

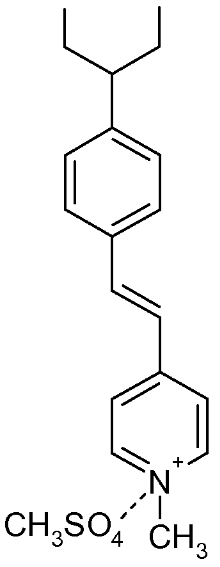


X^- (Ia)

in which

- R represents a hydrogen atom or a C_1-C_4 alkyl or C_1-C_4 hydroxyalkyl group,
- R' represents a hydrogen atom or a C_1-C_4 alkyl group, and
- X^- denotes an ion chosen from chloride, bromide, iodide, perchlorate, tetrafluoroborate, methyl sulfate, phosphate, sulfate, methanesulfonate and p-toluenesulfonate ions.

5. Process according to any one of the preceding claims, in which the photo-crosslinkable compound is a polyvinyl alcohol partly functionalized with one or more hydroxyl functions and one or more functions of formula (III):



(III)

6. Process according to Claim 1, in which the said photo-crosslinkable compound is chosen from polyurethane and/or polyurea polymers or oligomers bearing (meth)acrylate groups, in particular polyurethane (meth)acrylate oligomers.

7. Process according to any one of the preceding claims, in which step (ii) comprises the illumination of the surface of the said coat with ambient light, the said ambient light in particular emitting at least a proportion of radiation in the UV range.

8. Process according to any one of the preceding claims, in which step (ii) comprises the illumination of the surface of the said coat with a source of artificial light, in particular emitting a proportion of radiation in the UV range.

9. Process according to any one of the preceding claims, in which the said coating obtained after step (ii) has a thickness ranging from 10 µm to 5 mm, in particular from 50 µm to 2 mm and more particularly from 100 µm to 500 µm.

10. Process according to any one of the preceding claims, in which the said aerated coat is formed via at least the steps consisting in:

(a) applying to all or part of the eyelashes, eyebrows or eyelids, at least one coat of a composition with delayed expansion comprising at least the said photo-crosslinkable compound and at least one self-foaming compound, and

(b) exposing all or part of the said coat from step (a) to conditions favourable for expanding the said composition.

11. Process according to the preceding claim, in which the said self-foaming compound is chosen from slow-expanding systems such as isopentane, gas-releasing systems, such as systems releasing CO_2 by acidification of a carbonate or of aqueous hydrogen peroxide solution made unstable by basification or addition of a compound which promotes the dismutation of water, and heat-foaming or heat-expandable systems.

12. Process according to Claim 10 or 11, in which the said self-foaming compound is a slow-expanding system chosen from volatile hydrocarbons and volatile halogenated hydrocarbons with a boiling point ranging from -20 to 40°C, in particular from linear or branched C_4-C_6 aliphatic hydrocarbons.

13. Process according to any one of Claims 10 to 12, in which the said self-foaming compound is chosen from n-pentane, isopentane, neopentane, n-butane, isobutane and isohexane, and mixtures thereof; and preferably isopentane.

14. Process according to Claim 12 or 13, in which step (b) is performed in the ambient atmosphere, in particular for a time ranging from 10 seconds to 5 minutes.

15. Process according to any one of Claims 10 to 14, in which step (ii) is performed, on all or part of the surface of the said coat, before the complete expansion of the composition with delayed expansion.

16. Process according to any one of Claims 1 to 9, in which the said aerated coat is formed, simultaneously with its application to the surface of the eyelashes, eyebrows or eyelids, using a non-aerated base composition comprising the said photo-crosslinkable compound, and with the aid of an aerated-composition dispenser that can dispense the base composition in the form of an aerated composition.