DESCRIPTION

Title of Invention: AEROSOL-TYPE FOAMY OXIDATIVE HAIR DYE COMPOSITION

Technical Field

[0001]

The invention according to the present application relates to an oxidative hair dye composition. More particularly, the present invention relates to an aerosol-type foamy oxidative hair dye composition.

Background Art

[0002]

There has hitherto been known an aerosol-type foamy oxidative hair dye composition which is discharged in a foamy state using a propellant such as LPG. The aerosol-type foamy oxidative hair dye composition is stored in an aerosol container after filling the aerosol container with a propellant, using the respective agents as a stock solution.

[0003]

When using, the aerosol-type foamy oxidative hair dye composition is simply operated as compared with a dosage form such as liquid or cream since it is dischargeable in a foamy state only by pushing a button. It has also a merit allowing use in plural portions.

[0004]

The aerosol-type foamy oxidative hair dye composition usually includes, as constituents, a first agent blended with an alkali agent and a dye component, and a second agent blended with an oxidizing agent. The first agent and the second agent are separately stored, and mixed before use.

[0005]

As disclosed in Patent Document 1 mentioned below, there has been known an aerosol-type foamy oxidative hair dye/bleach composition, which has suppressed irritant odor and has satisfactory cozy touch of the hair after a hair dyeing or bleaching treatment. By employing a preferred embodiment of the composition, it is possible to obtain an opposite effect of improving shape retention of foam and quickly performing foam breakage after applying to the hair.

As disclosed in Patent Document 1 mentioned below, blending of an amphoteric polymer with the aerosol-type foamy oxidative hair dye composition is performed.

[0006]

Various aerosol containers have been known, including an aerosol container disclosed in Patent Document 2 mentioned below. The aerosol container disclosed in Patent Document 2 mentioned below has a simultaneous mixing and discharging mechanism and includes, as constituents, two cans and a head portion, while a first agent blended with an alkali agent and

a second agent blended with an oxidizing agent are stored in a separate can, together with a propellant. Pressing of a lever 30d of the aerosol container enables electric conduction of a discharge portion 30c with the outside, and the first agent and the second agent respectively reach a mixing passage 30m through a stem 30j and a communication hole 30l from each can 30f, where the first agent and the second agent are mixed, and then discharged through the discharge portion 30c in a dosage form of foam.

Citation List

Patent Literature

[0007]

Patent Literature 1: JP 2010-280579 A

Patent Literature 2: JP 2002-284655 A

Summary of Invention

Technical Problem

[0008]

- Regarding Group of Ist Invention -

Foam of an aerosol-type foamy oxidative hair dye composition can exhibit various behaviors. For example, when applied to the hair, there existed foam of a type foam quickly disappears and foam of a type in which foam becomes bulky and fluffy during an operation of applying over the whole hair. Heretofore, unevenness in dyeing have often occurred in the

aerosol-type foamy oxidative hair dye composition. Insufficient hair dyeing have often occurred.

[0009]

The aerosol-type foamy oxidative hair dye composition is capable of obtaining very fine foam in plural portions. Capable of using in plural portions is a merit of the aerosol-type foamy oxidative hair dye composition. However, since we are usually unable to visually observe the contents of the aerosol container, and thus it is difficult to accurately grasp the weight of discharged foam by the sensation of the hand. In the case of applying to the hair by discharging from the aerosol container in plural portions, it is more difficult to accurately grasp the total weight or the total volume of discharged foam by the sensation of the hand.

[0010]

An oxidative dye is often colorless before color development and, if foam disappears during an applying operation, we become unable to recognize to what range the applying operation has finished, and to what degree foam has been applied, thus leading to one of causes of unevenness in dyeing.

[0011]

Also, when foam becomes bulky and fluffy during the applying operation, we become unable to recognize to what degree foam has been applied on the hair. In this case, since foam

becomes bulky later even if the weight of foam applied is constant, insufficient hair dyeing often occurred as a result of lack of the total weight of foam. Unevenness in dyeing often occurred since bulkiness of foam cannot be uniformly increased.

[0012]

Thus, the inventors of the present application have noticed the point that users of the aerosol-type foamy oxidative hair dye composition "judge that appropriate applying was performed by visually observing a state of foam on the hair".

[0013]

A conventional aerosol-type foamy oxidative hair dye composition undergoes defoaming after applying on the hair, while bulkiness increases during an applying operation. Therefore, there was a difference between the weight of visually recognized foam and the weight of foam applied actually on the hair.

[0014]

The inventors of the present application have intensively studied and found that suppression of a change in foam specific gravity with a lapse of time enables the use of the aerosol-type foamy oxidative hair dye composition as per recognition due to visual observation of users. In other words, they have found that there exists an appropriate range where bulkiness neither increases nor decreases, excessively, which enables control of the recognition and hair dyeing effect of users.

[0015]

It is an object to be achieved by the present application to provide an aerosol-type oxidative hair dye composition which is excellent in level dyeability, hair dyeing power, and operability, and is capable of satisfactorily suppressing dripping.

- Regarding IInd Invention Group -

[0016]

Patent Document 1 mentioned above discloses that use of an amphoteric polymer, a specific alkali component, and lanolin as essential components enables the production of an aerosol-type foamy oxidative hair dye and bleach composition which has suppressed irritant odor and has satisfactory cozy touch of the hair after a hair dyeing or bleaching treatment.

[0017]

From another point of view, however, there is room for improvement with respect to stability of emulsion, viscosity stability, and level dyeability. Particularly, in the first agent, strong request for improvement of them was made. In the aerosol-type foamy oxidative hair dye composition, stability of emulsion during storage is important. An improvement in stability of emulsion becomes particularly important so as to make use of a merit capable of using in plural portions.

[0018]

In general, since a plural agents-type oxidative hair dye composition utilizes the action of an alkali agent and an oxidizing agent, it is important that a first agent blended with an alkali agent can be satisfactorily mixed with a second agent blended with an oxidizing agent. Mixability is also important in the aerosol-type foamy oxidative hair dye composition.

[0019]

Within a low viscosity range of 2,000 mPa·s or less, the second agent blended with an oxidizing agent is often excellent in stability of viscosity. The first agent containing an alkali agent sometimes contains a component in the form of a salt in the amount larger than that of the second agent, thus becoming it difficult to stably maintain the viscosity within a low viscosity range. If it becomes impossible for the first agent to maintain the initial viscosity at its production, a difference between the viscosity of the first agent and that of the second agent increases, leading to deterioration of mixability.

[0020]

When the first agent blended with an alkali agent is an emulsion, if the first agent has a low viscosity, a water-soluble component may be separated from an oliy component since emulsification cannot be maintained. The same shall apply to a one part-type aerosol-type foamy oxidative hair dye composition, and it may become impossible to uniformly

discharge the contents when separation occurs since emulsification cannot be maintained.

[0021]

The inventors of the present application have intensively studied and found that stability of emulsion, viscosity stability, and level dyeability can be improved by blending a cationic polymer, in addition to an amphoteric polymer.

[0022]

Thus, an object to be achieved is to provide an aerosol-type foamy oxidative hair dye composition which is excellent in stability of emulsion, viscosity stability, and level dyeability.

Solution to Problem

[0023]

- Ist Invention Group -

(First Invention)

The constitution of a first invention of the present application for achieving the above object is an aerosol-type foamy oxidative hair dye composition in which plural agents are mixed after discharging when used, characterized in that:

a mixture of the plural agents has an initial foam specific gravity of 0.03 to 0.18, and

a rate of change in foam specific gravity, which is determined by a foam specific gravity measured 5 minutes after mixing and the initial foam specific gravity, is 100% to 150%.

[0024]

(Second Invention)

The constitution of a second invention of the present application for achieving the above object is the aerosol-type foamy oxidative hair dye composition according to the first invention, wherein the amount of an oliy component blended in the mixture is 10% by mass or less.

[0025]

(Third Invention)

The constitution of a third invention of the present application for achieving the above object is the aerosol-type foamy oxidative hair dye composition according to first invention or second invention, wherein the amount of an ionic surfactant blended in the mixture is 6% by mass or less.

[0026]

(Fourth Invention)

The constitution of a fourth invention of the present application for achieving the above object is the aerosol-type foamy oxidative hair dye composition according to any one of the first invention to the third invention, wherein a mass ratio of the ionic surfactant to the solid higher alcohol, ionic surfactant/solid higher alcohol, is 0 to 3 in the mixture.

[0027]

- IInd Invention Group -

(ist Invention)

The constitution of a ist invention of the present application for achieving the above object is an aerosol-type foamy oxidative hair dye composition in which plural agents are mixed after discharging when used, characterized in that:

at least one agent of the plural agents is an emulsion which has a viscosity of 2,000 mPa·s or less, and is blended with an amphoteric polymer and a cationic polymer.

[0028]

(iind Invention)

The constitution of a iind invention of the present application for achieving the above object is the aerosol-type foamy oxidative hair dye composition according to the ist invention, wherein a mass ratio of the amphoteric polymer to the cationic polymer, amphoteric polymer/cationic polymer is 0.1 to 20.

[0029]

(iiird Invention)

The constitution of a iiird invention of the present application for achieving the above object is an aerosol-type foamy oxidative hair dye composition according to the ist invention or iind invention, wherein one, or two or more

selected from a resorcin, and resorcin inclusion complexes with saccharides is further blended.

[0030]

(ivth Invention)

The constitution of a ivth invention of the present application for achieving the above object is an aerosol-type foamy oxidative hair dye composition according to the iiird invention, wherein the blending amount of one, or two or more selected from a resorcin, and resorcin inclusion complexes with saccharides is 0.2 to 1.0% by mass.

Advantageous Effects of Invention

[0031]

- Group of Ist Invention-

The aerosol-type foamy oxidative hair dye composition disclosed by the present application is excellent in level dyeability, hair dyeing power, and operability, and is capable of satisfactorily suppressing dripping. Group of First Invention mainly exerts the satisfactory effect in the use of the aerosol-type foamy oxidative hair dye composition.

[0032]

- IInd Invention Group -

By blending, in addition to the amphoteric polymer, a cationic polymer, the obtained aerosol-type foamy oxidative hair dye composition is excellent in stability of emulsion,

viscosity stability, and level dyeability. The IInd invention group mainly exert satisfactory effect during storage of the aerosol-type foamy oxidative hair dye composition.

[0033]

The inventors of the present application estimate that both polymers form a complex by blending, in addition to the amphoteric polymer, a cationic polymer, and thus the complex contribute to the above effect.

[0034]

From the viewpoint of the effect exerted by the aerosol-type foamy oxidative hair dye composition disclosed by the present application, the constitution of the second invention is preferable.

[0035]

When a resorcin, and resorcin inclusion complexes with saccharides is blended as the dye component, emulsion stability is more improved. Thus, the inventors of the present application have found that a resorcin, and resorcin inclusion complexes with saccharides can also serve as a stable component of an emulsion. The inventors of the present application have also found a method for stabilizing an emulsion utilizing a resorcin, and resorcin inclusion complexes with saccharides.

Description of Embodiments

[0036]

Embodiments of the present invention disclosed by the present application will be described below, including the best embodiment thereof.

[0037]

First, terms will be described. As used herein, the term "hair" is not particularly limited and preferably refers to hair in a state of growing on the head. The hair is preferably human hair.

[0038]

As used herein, the term "oxidative hair dye composition" means a hair dye composition blended with an oxidative dye. Since the oxidative hair dye composition is stored in an aerosol container together with a propellant, and is used by discharging in a form state, the oxidative hair dye composition is referred to as an aerosol-type foamy oxidative hair dye composition. The aerosol-type foamy oxidative hair dye composition is a hair dye composition of plural agent-type. The aerosol-type foamy oxidative hair dye composition may be a hair dye composition of either two agent-type or three or more-agents type, and preferably two agent-type.

In the IInd invention group, at least one agent of plural agents constituting the aerosol-type foamy oxidative hair dye composition satisfies the condition (A) mentioned below.

[0039]

For convenience of description, in the description disclosed by the present application, the respective agents constituting the aerosol-type foamy oxidative hair dye composition is mentioned as that containing no propellant. In Examples mentioned below, the respective agents containing no propellant is called a “stock solution”, and is sealed into an aerosol container by being filled with a propellant. The propellant and the aerosol container will be mentioned below.

[0040]

As used herein, the term “mixture” of the aerosol-type foamy oxidative hair dye composition refers to a mixture of plural agents constituting the aerosol-type foamy oxidative hair dye composition. Regarding the aerosol-type foamy oxidative hair dye composition disclosed by the present application, since plural agents are discharged from the aerosol container when used, the mixture is applied to the hair in a foamy state, and maintains a foamy state for a given time. However, the mixture also refers to a mixture in a state where foam is broken after applying to the hair.

[0041]

In the case of a plural agents-type/aerosol-type foamy oxidative hair dye composition, a hair dyeing treatment is performed by mixing plural agents containing a first agent blended with an alkali agent and a second agent blended with an oxidizing agent immediately before use. There is no

particular limitation on a method for mixing the plural agents and a method for applying to the hair in the invention disclosed by the present application. Preferably, the method is any one of the following methods:

(1) a method in which plural agents are separately discharged from an aerosol container, and then mixed before applying to the hair;

(2) a method in which plural agents are separately discharged from an aerosol container, and then mixed on applying to the hair;

(3) a method in which plural agents are separately discharged from an aerosol container, and then mixed on the hair after applying to the hair; and

(4) a method in which plural agents are mixed in an aerosol container or a head, and the mixture is discharged from an aerosol container and then applied to the hair.

[0042]

It is preferred that the respective agents or mixture thus discharged are/is applied directly to the hair or after once taking in the hand or brush. When using the hand, it is preferred to wear a glove. The foam may be either applied over the whole hair or applied to a specific portion.

[0043]

The viscosity can be determined at 25°C using a B-type viscometer under the following measuring conditions (rotor No.

2, one minute, and 12 rpm/minute). Specific examples of the B-type viscometer include a BL-type viscometer VISCOMETER (manufactured by TOKI SANGYO CO., LTD.).

[0044]

- Group of Ist Invention -

[Aerosol-Type Foamy Oxidative Hair Dye Composition]

The present application discloses an aerosol-type foamy oxidative hair dye composition in which plural agents are mixed after discharging when used, characterized in that: a mixture of the plural agents has an initial foam specific gravity of 0.03 to 0.18; and a rate of change in foam specific gravity, which is determined by a foam specific gravity measured 5 minutes after mixing and the initial foam specific gravity, is 100% to 150%.

[0045]

First, a basic constitution of the aerosol-type foamy oxidative hair dye composition will be described.

[0046]

- First Agent -

An aerosol-type foamy oxidative hair dye composition disclosed by the present application includes, as a constituent, a first agent blended with an alkali agent.

[0047]

The amount of the alkali agent blended in the first agent is preferably 0.5 to 20% by mass. The first agent preferably has the pH of 8 to 12.

[0048]

The dosage form of the first agent is not particularly limited as long as it can be discharged in a foamy state from an aerosol container. Examples thereof include an emulsion, a solubilized material, and the like. The dosage form is preferably an emulsion.

[0049]

The first agent is blended with an alkali agent. Examples of the alkali agent include ammonia, ammonium salt, alkanolamine, organic amines (2-amino-2-methyl-1,3-propanediol, guanidine, etc.), inorganic alkali (sodium hydroxide, potassium hydroxide, etc.), carbonate (sodium carbonate, potassium carbonate, ammonium carbonate, ammonium hydrogen carbonate, etc.), basic amino acid (arginine, lysine, etc.), and salts thereof. Specific examples of the alkanolamine include monoethanolamine, diethanolamine, triethanolamine, monopropanolamine, isopropanolamine, dipropanolamine, tripropanolamine, 2-amino-2-methyl-1,3-propanediol, 2-amino-2-methyl-1-propanol, 2-amino-2-hydroxymethyl-1,3-propanediol, and the like. It is

possible to use these alkali agents alone, or two or more thereof.

[0050]

The first agent is blended with an oxidative dye. It may be further blended with a direct dye.

[0051]

The oxidative dye is a compound capable of developing a color by oxidation polymerization. There is no particular limitation on the oxidative dye, and examples thereof include a dye intermediate, a coupler, a melanin precursor, and the like.

[0052]

More specifically, examples of the oxidative dye include phenylenediamine and derivatives thereof, phenol derivatives, aminophenol and derivatives thereof, diphenylamine and derivatives thereof, pyridine derivatives, pyrimidine derivatives, pyrazole derivatives, pyrrolidine derivatives, toluene derivatives, indole derivatives, pyrrole derivatives, and imidazole derivatives.

[0053]

More specifically, examples of the dye intermediate include phenylenediamines (excluding metaphenylenediamine), aminophenols (excluding meta-aminophenol, 2,4-diaminophenol, and para-methylaminophenol), toluylene diamines (excluding toluene-3,4-diamine and toluene-2,4-diamine), diphenylamines,

diaminophenylamines, N-phenylphenylenediamines, diaminopyridines (excluding 2,6-diaminopyridine), and the like.

[0054]

Examples of the coupler include pyrogallol, resorcin, catechol, meta-aminophenol, metaphenylenediamine, 2,4-diaminophenol, 1,2,4-benzenetriol, toluene-3,4-diamine, toluene-2,4-diamine, hydroquinone, α-naphthol, 2,6-diaminopyridine, 1,5-dihydroxynaphthalene, 5-amino-ortho-cresol, para-methylaminophenol, 2,4-diaminophenoxyethanol, gallic acid, tannic acid, ethyl gallate, methyl gallate, propyl gallate, sumac gallnut, 5-(2-hydroxyethylamino)-2-methylphenol, and the like.

[0055]

The oxidative dye has a concept that a salt of a compound capable of developing a color by oxidation polymerization is included. Examples thereof include acid addition salts of the respective compounds mentioned above. Preferably, additions salts of organic acids, addition salts of inorganic acids, and the like are exemplified.

[0056]

These oxidative dyes may be blended alone, or blended in combination.

[0057]

Examples of the direct dye include an acid dye, a basic dye, a natural dye, a nitro dye, a disperse dye, and the like. These direct dyes may be blended alone, or blended in combination.

[0058]

Examples of the acid dye mentioned above include Red No. 2, Red No. 3, Red No. 102, Red No. 104(1), Red No. 105(1), Red No. 106, Red No. 227, Red No. 230(1), Yellow No. 4, Yellow No. 5, Yellow No. 202(1), Yellow No. 202(2), Yellow No. 203, Orange No. 205, Orange No. 207, Orange No. 402, Green No. 3, Green No. 204, Green No. 401, Violet No. 401, Blue No. 1, Blue No. 2, Blue No. 202, Brown No. 201, Black No. 401, and the like.

[0059]

Examples of the basic dye mentioned above include Basic Blue 3, Basic Blue 6, Basic Blue 7, Basic Blue 9, Basic Blue 26, Basic Blue 41, Basic Blue 47, Basic Blue 99, Basic Brown 4, Basic Brown 16, Basic Brown 17, Basic Green 1, Basic Green 4, Basic Orange 1, Basic Orange 2, Basic Orange 31, Basic Red 1, Basic Red 2, Basic Red 22, Basic Red 46, Basic Red 51, Basic Red 76, Basic Red 118, Basic Violet 1, Basic Violet 3, Basic Violet 4, Basic Violet 10, Basic Violet11:1, Basic Violet 14, Basic Violet 16, Basic Yellow 11, Basic Yellow 28, Basic Yellow 57, Basic Yellow 87, and the like.

[0060]

Examples of the natural dye mentioned above include a gardenia pigment, a turmeric pigment, an annatto pigment, a copper chlorophyllin sodium, a paprika pigment, a lac pigment, and the like.

[0061]

Examples of the nitro dye mentioned above include 4-nitro-o-phenylenediamine, 2-nitro-p-phenylenediamine, 2-amino-4-nitrophenol, 2-amino-5-nitrophenol, picramic acid, picric acid, and salts thereof, HC Blue No. 2, HC Blue No. 5, HC Blue No. 6, HC Blue No. 9, HC Blue No. 10, HC Blue No. 11, HC Blue No. 12, HC Blue No. 13, HC Orange No. 1, HC Orange No. 2, HC Orange No. 3, HC Red No. 1, HC Red No. 3, HC Red No. 7, HC Red No. 10, HC Red No. 11, HC Red No. 13, HC Red No. 14, HC Violet No. 1, HC Violet No. 2, HC Yellow No. 2, HC Yellow No. 4, HC Yellow No. 5, HC Yellow No. 6, HC Yellow No. 9, HC Yellow No. 10, HC Yellow No. 11, HC Yellow No. 12, HC Yellow No. 13, HC Yellow No. 14, HC Yellow No. 15, and the like.

[0062]

Examples of the disperse dye mentioned above include Disperse Black 9, Disperse Blue 1, Disperse Blue 3, Disperse Blue 7, Disperse Brown 4, Disperse Orange 3, Disperse Red 11, Disperse Red 15, Disperse Red 17, Disperse Violet 1, Disperse Violet 4, Disperse Violet 15, and the like.

[0063]

- Second Agent -

An aerosol-type foamy oxidative hair dye composition disclosed by the present application includes, as a constituent, a second agent blended with an oxidizing agent.

[0064]

The amount of the oxidizing agent blended in the second agent is preferably 0.1 to 15% by mass. The second agent preferably has the pH of 1 to 5.

[0065]

The dosage form of the second agent is preferably an emulsion or a solubilized material. More preferably, the dosage form is an emulsion.

[0066]

The second agent is blended with an oxidizing agent. Examples of the oxidizing agent include hydrogen peroxide, urea peroxide, melamine peroxide, sodium percarbonate, potassium percarbonate, sodium perborate, potassium perborate, sodium peroxide, potassium peroxide, magnesium peroxide, barium peroxide, calcium peroxide, strontium peroxide, hydrogen peroxide adducts of sulfate, hydrogen peroxide adducts of phosphate, hydrogen peroxide adducts of pyrophosphate, and the like. These oxidizing agents may be blended alone, or two or more thereof may be blended in combination. Of these oxidizing agents, hydrogen peroxide is preferable because of being excellent in decomposition of melanin.

[0067]

- Other Components in Each Agent –

An aerosol-type foamy oxidative hair dye composition disclosed by the present application contains plural agents which contain the first agent and second agent mentioned above. Plural agents may be blended with optional components, including the components mentioned above. For example, it is possible to be blended with at least one selected from water; hydroxyethyl celluloses; amphoteric polymers; water-soluble polymers including a cationic polymer; higher alcohols; solvents; surfactants; thickeners; amino acids excluding basic amino acid; fatty acids; oliy component; saccharides such as sorbitol and maltose; preservative components such as parabene and sodium benzoate; chelate components such as EDTA-2Na, diethylenetriaminepentaacetic acid, and hydroxyethanediphosphonic acid; stabilizing components such as phenacetin, 8-hydroxyquinoline, acetoanilide, phenoxyethanol, sodium pyrophosphate, barbituric acid, uric acid, and tannic acid; pH adjusting components; antioxidants such as Na sulfite; plants or herbal medicine extracts; vitamins including ascorbic acids; perfume, and the like. It is also possible to be blended with at least one selected from those listed in "Japanese Standards of Quasi-drug Ingredients 2006" (YAKUJINIPPO).

[0068]

[Preferable Conditions of Each Agent constituting Aerosol-Type Foamy Oxidative Hair Dye Composition]

An aerosol-type foamy oxidative hair dye composition disclosed by the present application is composed of plural agents. Preferably, any one of plural agents satisfies one or more of the following conditions. It is also preferable that one of plural agents satisfies two or more of the following conditions. It is also preferable that one of plural agents satisfies one, or two or more of the following conditions. A combination of the respective agents and conditions mentioned above can be appropriately selected.

[0069]

Any one, or two or more of the respective agents is/are preferably blended with a C14 or less polyoxyethylene (hereinafter also referred to as POE) alkyl ether as a nonionic surfactant from the viewpoint of an improvement in foamability. The "C14" means the number of carbon atoms (14) of an alkyl group. Hereinafter, in the POE alkyl ether, the number of carbon atoms of an alkyl group may be sometimes represented by C and the number thereof. Although it is limited to the case immediately after discharging, enhanced foamability may lead to a decrease in foam specific gravity. One of techniques for realizing desired foam specific gravity includes control of foamability.

[0070]

Specific examples of the C14 or less POE alkyl ether include POE lauryl ether and POE myristyl ether. The polyoxyethylene preferably has a polymerization degree of 2 to 30. The C14 or less alkyl group is preferably saturated and is preferably linear.

[0071]

It is more preferable to use a C14 or less POE alkyl ether in combination with a C16 or more POE alkyl ether. Examples of the C16 or more POE alkyl ether include POE cetyl ether, POE oleyl ether, POE stearyl ether, POE isostearyl ether, and POE behenyl ether. The polyoxyethylene preferably has a polymerization degree of 2 to 50. The C16 or more alkyl group is preferably saturated and is preferably linear.

[0072]

In an agent in which a C14 or less POE alkyl ether is used in combination with a C16 or more POE alkyl ether, a mass ratio "C16 or more POE alkyl ether/C14 or less POE alkyl ether" of a nonionic surfactant is preferably 0.1 to 7, and more preferably 0.5 to 3. When the mass ratio of them is within the above range, foamability is more improved.

[0073]

The amount of the C14 or less POE alkyl ether blended in the respective agents is preferably 0.1 to 10% by mass. The amount of the C16 or more POE alkyl ether blended in the respective agents is preferably 0.1 to 10% by mass.

[0074]

Any one, or two or more of the respective agents is/are preferably blended with any one, or two or more of ionic surfactant(s) selected from cationic surfactants, anionic surfactants, and amphoteric surfactants from the viewpoint of an improvement in foamability. The amount of the ionic surfactant blended in the respective agents is preferably 0.01 to 5% by mass. Preferable conditions in a mixture will be mentioned below.

[0075]

Example of the amphoteric surfactants include carbobetaine-type, amidebetaine-type, sulfobetaine-type, hydroxysulfobetaine-type, amidesulfobetaine-type, phosphobetaine-type, imidazolinium-type, alkylbetaine-type, alkylamidebetaine-type, amino acid-based amphoteric surfactant-type, and amine oxide-type surfactants. It is possible to use one, or two or more of these amphoteric surfactants. The same shall apply to the following specific examples. The amphoteric surfactants are preferably, alkylbetaine-type, amidebetaine-type, alkylamidebetaine-type, and imidazolinium-type amphoteric surfactants.

[0076]

More specifically, examples thereof include alkylcarboxymethyl hydroxyethyl imidazolium betaine, 2-alkyl-N-carboxymethyl-N-hydroxyethyl imidazolinium betaine,

lauryl dimethyl betaine, lauryl dimethyl aminoacetic acid betaine, sodium undecynoyl-carboxymethoxyethyl carboxymethyl imidazolinium betaine, sodium undecyl hydroxyethyl imidazolinium betaine, undecyl-N-hydroxyethyl-N-carboxymethyl imidazolinium betaine, hydrochloric acid alkyldiaminoethyl glycine solution, stearyl dihydroxyethyl betaine, stearyl dimethylaminoacetic acid betaine, stearyl dimethyl betaine sodium, bis(stearyl-N-hydroxyethylimidazoline)chloroacetic acid complex, sodium coconut oil alkyl-N-carboxyethyl-N-hydroxyethylimidazolinium betaine, coconut oil alkyl-N-carboxyethoxyethyl-N-carboxyethylimidazolinium disodium hydroxide, coconut oil alkyl-N-carboxymethoxyethyl-N-carboxyethylimidazolinium disodium hydroxide, coconut oil alkyl-N-carboxymethoxyethyl-N-carboxyethylimidazolinium disodium sulfuric acid, coconut oil alkyl betaine, coconut oil fatty acid amidepropyl betaine solution, sodium coconut oil fatty acid-N-carboxymethoxyethyl-N-carboxyethyl imidazolinium betaine, laurylaminopropionic acid triethanolamine, sodium β-laurylaminopropionate, lauryl N-carboxymethoxyethyl-N-carboxymethyl imidazolinium disodium dodecanoyl sarcosin, sodium lauryl diaminoethyl glycine,

lauric acid amide propyl betaine, lauric acid amide ropyldimethylaminoacetic acid, and the like.

[0077]

The cationic surfactant has a basic structure in which a hydrocarbon group optionally having a substituent is attached to a nitrogen atom. The substituents may be combined to form a ring structure. Usually, the nitrogen atom is quaternary. The quaternary nitrogen atom is cationic and, usually, a counter ion exists. Examples of the counter ion include chloride ion, bromide ion, iodide ion, alkylsulfuric acid ion, and saccharin. The hydrocarbon group may be either linear or branched. One, or two or more of cationic surfactant(s) may be used. The same shall apply to the following specific examples.

[0078]

Examples of the cationic surfactant include an alkyltrimethylammonium salt, an alkenyltrimethylammonium salt, a dialkyldimethylammonium salt, a dialkenyldimethylammonium salt, an alkyloyl amidepropyldimethylamine, an alkylpyridinium salt, and a benzalkonium salt.

[0079]

Specific examples thereof include cetyltrimethylammonium chloride, stearyltrimethylammonium chloride, isostearyltrimethylammonium chloride, lauryltrimethylammonium chloride, behenyltrimethylammonium chloride, octadecyltrimethylammonium chloride,

cocoyltrimethylammonium chloride, cetyltrimethylammonium bromide, stearyltrimethylammonium bromide, lauryltrimethylammonium bromide, isostearyllauryldimethylammonium chloride, dicetyldimethylammonium chloride, distearyldimethylammonium chloride, dicocoyldimethylammonium chloride, γ-gluconamide propyl dimethyl hydroxyethyl ammonium chloride, di(polyoxyethylene)oleylmethylammonium chloride, dodecyldimethylethylammonium chloride, octyldihydroxyethylmethylammonium chloride, tri(polyoxyethylene)stearylammonium chloride, polyoxypropylenemethyldiethylammonium chloride, lauryldimethyl(ethylbenzyl)ammonium chloride, behenic acid amide propyl-N,N-dimethyl-N-(2,3-dihydroxypropyl)ammonium chloride, tallow dimethylammoniopropyltrimethylammonium dichloride, and benzalconium chloride.

[0080]

It is preferable to be blended with an alkyltrimethylammonium and a salt of an alkyl group alkyl group having 16 or less carbon atoms as a cationic surfactant (hereinafter, in alkyltrimethylammonium, the number of carbon atoms of an alkyl group such as may be sometimes represented by C and the number thereof, for example, C16 or less). Specific examples thereof include lauryltrimethylammonium, cetyltrimethylammonium, and salts thereof. The C16 or less

alkyl group in the cationic surfactant is preferably saturated, and preferably linear.

[0081]

The amount of the C16 or less alkyltrimethylammonium and a salt thereof blended in the respective agents is preferably 0.01 to 5% by mass.

[0082]

Examples of the anionic surfactant include alkyl ether sulfate, alkyl sulfate, alkenyl ether sulfate, alkenyl sulfate, olefin sulfonate, alkane sulfonate, alkyl or alkenyl ether carboxylate, and α-sulfone fatty acid salt of POE sodium lauryl sulfate, N-acylamino acid-type surfactant, phosphoric acid mono- or diester-type surfactant, and sulfosuccinic acid ester. One, or two or more of these anionic surfactant(s) may be used.

[0083]

Examples of the counter ion of an anion group of these anionic surfactants include sodium ion, potassium ion, and triethanolamine.

[0084]

One, or two or more of the respective agents may be blended with an oliy component. When blended with the oliy component, moist touch and gloss can be imparted to the hair. The amount of the oliy component blended in the respective agents is preferably 10% by mass or less, more preferably 0.01 to 8% by mass, and still more preferably 0.01 to 6% by mass. When the

amount is within preferable range mentioned above, defoaming is suppressed and thus foam is likely to remain.

[0085]

Meanwhile, in the aerosol-type foamy oxidative hair dye composition disclosed by the present application, it is sometimes requested to be blended with a component having an appropriate defoaming effect so as to realize suitable foam specific gravity of a mixture. The component having the appropriate defoaming effect is preferably an oliy component which is liquid at 25°C under 1 atm..

It is preferred to decrease the blending amount of a solid or pasty oliy component.

[0086]

Examples of the oliy component include fats or oils, waxes, hydrocarbons, alkyl glyceryl ethers, esters, and silicones. One, or two or more of these oliy components may be used. The same shall apply to the following specific examples. In the present application, a higher alcohol is not an oliy component.

[0087]

Examples of fats and oils include lanolin, olive oil, camellia oil, shea butter, almond oil, safflower oil, sunflower oil, soybean oil, cottonseed oil, sesame oil, corn oil, rapeseed oil, rice bran oil, rice germ oil, grapeseed oil, avocado oil, macadamia nut oil, castor oil, coconut oil, and evening primrose oil. Of these, fats and oils, which are liquid at 25°C under

1 atm., include olive oil, camellia oil, shea butter, almond oil, safflower oil, sunflower oil, soybean oil, cottonseed oil, sesame oil, corn oil, rapeseed oil, rice bran oil, rice germ oil, grapeseed oil, avocado oil, macadamia nut oil, castor oil, coconut oil, and evening primrose oil.

Examples of the wax include beeswax, candelilla wax, carnauba wax, and jojoba oil. Of these, wax, which is liquid at 25°C under 1 atm., includes jojoba oil.

[0088]

Examples of the hydrocarbon include paraffin, liquid paraffin, liquid isoparaffin, olefin oligomer, polyisobutene, hydrogenated polyisobutene, mineral oil, squalane, polybutene, polyethylene, microcrystalline wax, and petrolatum. Of these, the hydrocarbon, which is liquid at 25°C under 1 atm., includes liquid paraffin, liquid isoparaffin, olefin oligomer, polyisobutene, hydrogenated polyisobutene, mineral oil, and squalane.

[0089]

Examples of the alkyl glyceryl ether include batyl alcohol, chimyl alcohol, selachyl alcohol, and isostearyl glyceryl ether.

[0090]

Examples of the ester include diisopropyl adipate, isopropyl myristate, cetyl octanoate, isononyl isononanate, octyldodecyl myristate, isopropyl palmitate, stearyl stearate,

myristyl myristate, isotridecyl myristate, 2-ethylhexyl palmitate, octyldodecyl ricinoleate, fatty acid cholesterol/anosterol having 10 to 30 carbon atoms, cetyl lactate, di-2-ethylhexanoic acid ethylene glycol, pentaerythritol fatty acid ester, dipentaerythritol fatty acid ester, cetyl caprate, glyceryl tricaprylate, diisostearyl malate, dioctyl succinate, and cetyl 2-ethylhexanoate. Of these, the ester, which is liquid at 25°C under 1 atm., includes an ester having a branched structure, such as cetyl 2-ethylhexanoate.

[0091]

Examples of the silicone include dimethylpolysiloxane (dimethicone), methylphenylpolysiloxane, decamethylcyclopentasiloxane, dodecamethylcyclohexasiloxane, terminal hydroxyl group-modified dimethylpolysiloxane, highly polymerized silicone having an average polymerization degree of 650 to 10,000, polyether-modified silicone, amino-modified silicone, betaine-modified silicone, alkyl-modified silicone, alkoxy-modified silicone, mercapto-modified silicone, carboxy-modified silicone, and fluorine-modified silicone. Of these, the silicone, which is liquid at 25°C under 1 atm., includes dimethicone, terminal hydroxyl group-modified dimethylpolysiloxane, highly polymerized silicone having a dyanamic viscosity of 10,000 mm^2/s or less, polyether-modified

silicone, amino-modified silicone, and betaine-modified silicone.

[0092]

Any one, or two or more of the respective agents may be blended with a higher alcohol. The higher alcohol refers to a monohydric higher alcohol having 6 or more carbon atoms. The higher alcohol has a concept that a linear and branched higher alcohol is included. A linear and branched higher alcohol may be used in combination. The higher alcohol has a concept that a saturated and unsaturated higher alcohol is included. One, or two or more of these higher alcohols may be used. The same shall apply to the following specific examples.

[0093]

The amount of the higher alcohol blended in the respective agents is preferably 0.5% by mass or more, more preferably 0.5 to 5% by mass, still more preferably 0.5 to 3% by mass, yet preferably 0.5 to 1.5% by mass, and further preferably 0.7 to 1.2% by mass. When the blending amount of the higher alcohol is within preferable range mentioned above, foam quality and hair dyeing power are improved.

[0094]

Examples of the higher alcohol include lauryl alcohol, myristyl alcohol, cetyl alcohol (cetanol), 2-hexyl decanol, cetostearyl alcohol, stearyl alcohol, isostearyl alcohol,

oleyl alcohol, arakyl alcohol, 2-octyl dodecanol, behenyl alcohol, and decyl tetradecanol.

[0095]

Any one, or two or more of the respective agents may be blended with a solvent. Examples of the solvent include monohydric lower alcohol having 5 or less carbon atoms, such as ethanol, n-propanol, and isopropanol; polyols and lower alkylethers thereof. Examples of polyols include glycerin, propylene glycol, dipropylene glycol, 1,3-butylene glycol, ethylene glycol, diethylene glycol, polyethylene glycol (PEG), isoprene glycol, sorbitol, and the like. Examples of the lower alkyl ethers of polyol include monolower alkyl ethers and polylower alkyl ethers (for example, dilower alkyl ether, etc.) of the above-mentioned polyols.

[0096]

The amount of the solvent blended in the respective agents is preferably 10% by mass or less, and more preferably 0.01 to 8% by mass. When the blending amount is within preferable range mentioned above, hair dyeing power is improved and thus the agent is likely to be emulsified.

[0097]

When the aerosol-type foamy oxidative hair dye composition is a dye composition of three or more-agent type, the dosage form of the respective agents, which does not correspond to the first agent and second agents, is not limited.

Examples of the dosage form include an emulsion, a solubilized material, and the like. The dosage form is preferably an emulsion.

[0098]

[Propellant]

In the aerosol-type foamy oxidative hair dye composition disclosed by the present application, a well-known propellant can be used. Examples thereof include liquefied gases such as LPG and dimethylether; and compressed gasses such as a carbonic acid gas and a nitrogen gas. Of these, a liquefied gas is preferable. One, or two or more of gases can be used.

[0099]

A filling ratio of the respective agents and propellant, which constitute the aerosol-type foamy oxidative hair dye composition stored in the aerosol container, is preferably 90:10 to 98:2, and more preferably 92:8 to 97:3, in terms of a mass ratio. The mixing ratio of any one of plural agents is preferably controlled within a range of 92:8 to 97:3.

[0100]

When each agent constituting the aerosol-type foamy oxidative hair dye composition, such as a first agent and a second agent is an emulsion, each agent is an emulsion even in the stage of a stock solution containing no propellant and even after being filled with a propellant, taking the production process into consideration. If each agent is an emulsion after

being filled with a propellant, the stock solution corresponding to the respective agents is also an emulsion.

[0101]

[Mixture]

A mixing ratio of plural agents containing the first agent to the second agent can be appropriately determined. A mixing ratio of the first agent to the second agent, first agent:second agent, is preferably 1:5 to 5:1.

[0102]

A mixture of the respective agents constituting the aerosol-type foamy oxidative hair dye composition preferably has the pH of 7 to 12.

[0103]

The foam specific gravity is determined at 25°C by dividing the mass of foam by the volume. The unit is g/ml. The term "foam specific gravity measured 5 minutes after mixing" can be determined as follows: plural agents are mix and the mixture is applied to the hair for 5 minutes and, after 5 minutes, foam remained on the hair was collected and the foam specific gravity can be determined from the collected foam. Specific operation of the measurement of the initial foam specific gravity and the measurement of a foam specific gravity measured 5 minutes after mixing can be referred to "measurement of foam specific gravity" in Examples mentioned below.

[0104]

The initial foam specific gravity immediately after mixing the respective agents constituting the aerosol-type foamy oxidative hair dye composition (i.e. foam specific gravity before applying to the hair immediately after preparation of a mixture) is 0.03 to 0.18. When the initial foam specific gravity deviates from the range mentioned above, “ease of application, “less dripping”, “level dyeability”, and “hair dye composition” cannot be improved with satisfactory balance. When the initial foam specific gravity is less than 0.03, bulkiness is too large, thus lacking the total amount of a mixture to be applied to the hair. In this case, evaluation of “ease of application and “hair dyeing power” becomes particularly insufficient. When the initial foam specific gravity exceeds 0.18, bulkiness is too small. In this case, evaluation of “ease of application becomes particularly insufficient.

[0105]

The initial foam specific gravity is preferably 0.04 to 0.16, more preferably 0.05 to 0.15, and still more preferably 0.05 to 0.10. When the initial foam specific gravity is within preferable range mentioned above, “ease of application, “less dripping”, “level dyeability”, and “hair dyeing power” are improved with satisfactory balance.

[0106]

A rate of change in foam specific gravity (%) to be determined from a foam specific gravity measured 5 minutes after mixing and the above-mentioned initial foam specific gravity is determined by "(foam specific gravity measured 5 minutes after mixing/initial foam specific gravity) × 100". The aerosol-type foamy oxidative hair dye composition disclosed by the present application has a rate of change in foam specific gravity of 100% to 150%. When the rate of change in foam specific gravity deviates from the range mentioned above, evaluation of "less dripping", "level dyeability", and "hair dyeing power" is not improved with satisfactory balance. The rate of change in foam specific gravity is preferably 105 to 145%, and more preferably 110 to 140%. When the rate of change in foam specific gravity is within preferable range mentioned above, "ease of application, "less dripping", "level dyeability", and "hair dyeing power" are improved with satisfactory balance.

[0107]

Preferable conditions in a mixture will be more described below. In the following description, preferable blending amount is mentioned based on 100% by mass of the total amount of the mixture. The amount of a specific component blended in the mixture will be described by way of the blending amount in the composition containing no propellant, as mentioned above. Usually, the respective agents constituting the aerosol-type

foamy oxidative hair dye composition are separately stored. Therefore, it is also possible to calculate the amount of a specific component blended in the mixture from the blending amount of the respective agents and a mixing ratio of the respective agents.

[0108]

The amount of an oliy component blended in the mixture is preferably 15% by mass or less, more preferably 0.01 to 10% by mass, still more preferably 0.05 to 8% by mass, and yet preferably 0.1 to 6% by mass. When the blending amount is within preferable range mentioned above, defoaming is suppressed and thus foam is likely to remain. Also, "little dripping" and "level dyeability" are improved with satisfactory balance. Blending with an oliy component enables imparting of moist touch and an improvement in gloss.

[0109]

Components corresponding to the oliy component and preferable component are the same as "preferable conditions with respect to the respective agents constituting the" above-mentioned "aerosol-type foamy oxidative hair dye composition". Components corresponding to a surfactant and a higher alcohol and a preferable component are the same.

[0110]

The amount of the ionic surfactant blended in the mixture is preferably 0.01 to 6% by mass, more preferably 0.05 to 5%

by mass, still more preferably 0.1 to 4% by mass, and yet preferably 0.1 to 3% by mass. When the amount is within preferable range mentioned above, "ease of application", "level dyeability", and "hair dyeing power" are improved with satisfactory balance.

[0111]

The amount of the higher alcohol blended in the mixture is preferably 0.5 to 5% by mass, and more preferably 0.5 to 3% by mass. When the amount is within preferable range mentioned above, there is an advantage that an improvement in air dyeing power and an improvement in foam quality can be simultaneously achieved.

[0112]

Furthermore, the mixture is preferably blended with behenyl alcohol as the higher alcohol. Blending with behenyl alcohol enables thickening (which refers to an elastic state) of foam quality, and thus foam is likely to remain. Thickening of foam quality also has an advantage that dripping is less likely to cause and foam is likely to be extended. The amount of behenyl alcohol blended in the mixture is preferably 0.01 to 2% by mass.

[0113]

In the mixture, among higher alcohol, an attention is paid on a higher alcohol which is solid at 25°C under 1 atm. (hereinafter, sometimes abbreviated to a "solid higher

alcohol”). Examples of the higher alcohol, which is solid at 25°C under 1 atm., include cetyl alcohol (cetanol), cetostearyl alcohol, stearyl alcohol, arakyl alcohol, and behenyl alcohol.

[0114]

From the viewpoint of an improvement in foamability and a rate of change in foam specific gravity, a mass ratio of an ionic surfactant to a solid higher alcohol in the mixture “ionic surfactant/solid higher alcohol” is preferably 0 to 3, more preferably 0.05 to 2.8, still more preferably 0.2 to 2.5, and yet preferably 0.3 to 2.0.

[0115]

For convenience of writing of a ratio, also when the amount of the solid higher alcohol blended in the mixture is 0, it is expressed that “ionic surfactant/solid higher alcohol = 0”.

[0116]

[Hair Dyeing Method]

As mentioned above, the present application also discloses a hair dyeing method in which attention is paid on initial foam specific gravity and rate of change in foam specific gravity of the mixture. It is easy for the aerosol-type foamy oxidative hair dye composition disclosed by the present application to visually grasp the amount of foam in the mixture, and thus the aerosol-type foamy oxidative hair dye composition is suited for an application method in which foam is applied to the hair in plural portions foam. Since

bulkiness of foam is maintained within a given range, desired hair dyeing effect is obtained by freely operating foam.

[0117]

The foamy oxidative hair dye composition satisfying the conditions that a mixture of the plural agents has an initial foam specific gravity of 0.03 to 0.18, and a rate of change in foam specific gravity, which is determined by a foam specific gravity measured 5 minutes after mixing and the initial foam specific gravity, is 100% to 150% is excellent in operability and is capable of suppressing unevenness in dyeing, thus obtaining the hair dyeing effect recognized by visual observation of users.

[0118]

[Aerosol Container]

The aerosol-type foamy oxidative hair dye composition disclosed by the present application can be stored in a well-known aerosol container. Since there is a need to mix a first agent blended with an alkali agent with a second agent blended with an oxidizing agent immediately before use, usually, the first agent and the second agent are separately stored. The first agent and the second agent may be stored in a separate aerosol container. When discharged by a power of a propellant, the propellant expands to form foam.

[0119]

For example, the aerosol container disclosed in Patent Document 2 mentioned above can be used. In the aerosol container, the first agent and the second agent are stored in a separate container and a foamy oxidative hair dye composition is discharged from a head portion. In Examples mentioned below, an aerosol container of this type is used.

[0120]

It is also possible to use an aerosol container in which two pouches and a connecting member are stored in one can and a mixture is discharged in a foamy state. It is also possible to use an aerosol container including an inner bag in which the respective agents and a propellant (for foaming) are stored in the inner bag, and the propellant (for extrusion) is stored outside the inner bag.

[0121]

The material and the inner pressure of the aerosol container can be appropriately determined according to types of an alkali agent, an oxidizing agent, and a propellant, and a storing method of the aerosol-type foamy oxidative hair dye composition.

[0122]

As mentioned above, the present application also discloses an aerosol-type foamy oxidative hair dye composition, and a product including a propellant and an aerosol container as constituents.

[0123]

- IInd Invention Group –

The IInd invention group will be described below. It is possible to refer to embodiments of the above-mentioned group of the first invention unless being contrary to the contents of the IInd invention group mentioned below. Particularly, it is possible to refer to the column "first agent", the column "second agent", the column "other components in the respective agents", the column "preferable conditions with respect to the respective agents constituting an aerosol-type foamy oxidative hair dye composition", the column "propellant", and the column "aerosol container".

[0124]

[Aerosol-Type Foamy Oxidative Hair Dye Composition]

Regarding the aerosol-type foamy oxidative hair dye composition which is discharged before use disclosed by the present application, at least one agent of plural agents satisfies the following condition (A):

(A) an emulsion having a viscosity of 2,000 mPa·s or less, blended with an amphoteric polymer and a cationic polymer.

[0125]

A first agent blended with an alkali agent preferably satisfies the condition (A). However, a second agent blended with an oxidizing agent may satisfy the condition (A). The first agent and the second agent may satisfy the condition (A).

[0126]

- First Agent -

The aerosol-type foamy oxidative hair dye composition disclosed by the present application includes, as a constituent, a first agent blended with an alkali agent. The first agent preferably satisfies the above condition (A), and more preferably one, or two or more of the conditions mentioned below.

[0127]

There is no limitation on dosage form of the first agent. Examples thereof include an emulsion, a solubilized material, and the like. Preferably, the dosage form is an emulsion. When the first agent satisfies the above condition (A), the dosage form of the first agent is an emulsion.

[0128]

The viscosity of the first agent is preferably 2,000 mPa·s or less, more preferably 1 to 1,500 mPa·s or less, and still more preferably 50 to 1,200 mPa·s or less. If the viscosity of the first agent exceeds 2,000 mPa·s, viscosity stability and level dyeability are insufficient. Meanwhile, when the viscosity is adjusted within preferable range mentioned above, level dyeability and operability during applying are improved. When the first agent satisfies the above condition (A), the viscosity of the first agent becomes 2,000 mPa·s or less, thus enabling employment of preferable viscosity mentioned above.

[0129]

When the first agent satisfies the above condition (A), the first agent is blended with an amphoteric polymer. A copolymer of a monomer having an anionic group such as a sulfonic acid group or a carboxyl group with a monomer having a cationic group such as an amino group, an ammonium group, or an alkylammonium group, and a polymer or a copolymer of a betaine-type monomer correspond to the amphoteric polymer. A molar ratio of the monomer having a cationic group to the monomer having an anionic group is limited to 0.7 to 1.5 in the copolymer. One, or two or more of these polymers may be used. The same shall apply to the following specific examples.

[0130]

Preferably, the amphoteric polymer is an acrylamide/acrylic acid/dimethyldiallylammonium chloride copolymer, an acrylic acid/methacrylamidepropyltrimethylammonium chloride/methylacrylate copolymer, or an acrylic acid/acrylic acid/methacrylamidepropyltrimethylammonium chloride copolymer. Specific examples thereof include Polyquotanium-39, Polyquotanium-47, and Polyquotanium-53 (all of which are INCI names). Specific examples of the acrylamide/acrylic acid/dimethyldiallylammonium chloride copolymer include MERQUAT PLUS 3330 (The Lubrizol Corporation), MERQUAT PLUS 3331 (The Lubrizol Corporation); specific examples

of the acrylic acid/methacrylamidepropyltrimethylammonium chloride/methyl acrylate copolymer include MERQUAT 2001 (The Lubrizol Corporation); and specific examples of the acrylic acid/acrylic acid/methacrylamidepropyltrimethylammonium chloride copolymer include MERQUAT 5300 (The Lubrizol Corporation).

[0131]

When the first agent satisfies the above condition (A), the first agent is blended with an amphoteric polymer. The amount of the amphoteric polymer blended in the first agent is preferably 0.01 to 1% by mass, and more preferably 0.05 to 0.5% by mass.

[0132]

When the first agent satisfies the above condition (A), the first agent is blended with a cationic polymer. Cationized polysaccharides such as cationized cellulose, cationic starch, and cationized guar gum, a polymer or a copolymer of a diallyldialkylammonium salt, a quaternized copolymer of vinylpyrrolidone, Polyquotanium-2, Polyquotanium-17, Polyquotanium-18, and Polyquotanium-34 correspond to the cationic polymer. One, or two or more of these cationic polymers may be used. The same shall apply to the following specific examples.

[0133]

Examples of the cationized celluloses include Polyquotanium-10 which is commercially available as LEOGARD G, LEOGARD GP (Lion Corporation), Polymer JR-125, Polymer JR-400, Polymer JR-30M (The Dow Chemical Company, or the like; hydroxyethylcellulosedimethyldiallylammonium chloride (Polyquotanium-4) which is commercially available as CATINAL HC100, CATINAL HC200, CATINAL LC100, CATINAL LC200 (TOHO Chemical Industry Co., Ltd.), or the like; and chlorinated O-[2-hydroxy-3-(trimethylammonio)propyl]hydroxyethyl cellulose.

[0134]

Examples of the cationized guar gum include guar hydroxy trimonium chlorides which are commercially available as Jaguar C-13S, Jaguar C-14S, and Jaguar C-17 (Rhodia Inc.)

[0135]

Examples of the polymer or copolymer of diallyldialkylammonium salt include polydimethyldiallylammonium chloride (Polyquotanium-6) which is commercially available as polydimethylmethylenepiperidinium chloride (MERQUAT 100, The Lubrizol Corporation); dimethyldiallylammonium chloride/acrylamide copolymer (Polyquotanium-7) which is commercially available as MERQUAT 550 (The Lubrizol Corporation); and dimethyldiallylammonium chloride/acrylic acid copolymer (Polyquotanium-22) which is commercially

available as MERQUAT 280, MERQUAT 295 (The Lubrizol Corporation), or the like. In the case of a copolymer of a monomer having a cationic group such as diallyldialkylammonium with a monomer having an anionic group such as acrylic acid, a molar ratio of the monomer having a cationic group to the monomer having an anionic group is limited to 1.6 or more in the copolymer.

[0136]

Examples of the quaternized copolymer of vinylpyrrolidone include Polyquotanium-11 which is commercially available as Gafquat 734, Gafquat 755, Gafquat 755N (ISP Corporation), or the like; Polyquotanium-16 which is commercially available as Luviquat FC 307, Luviquat FC FC550, Luviquat FC 905 (BASF Corporation), or the like; and Polyquotanium-28 which is commercially available as Gafquat HS-100 (ISP Corporation), or the like.

[0137]

The cationic polymer is preferably a cationized polysaccharide, or a polymer or copolymer of a diallyldialkylammonium salt, and more preferably a polymer or copolymer of a diallyldialkylammonium salt.

[0138]

When the first agent satisfies the above condition (A), the first agent is blended with a cationic polymer. The amount

of the cationic polymer blended in the first agent is preferably 0.01 to 1% by mass, and more preferably 0.05 to 0.5% by mass.

[0139]

The mass ratio of the amphoteric polymer to the cationic polymer in the first agent, "amphoteric polymer/cationic polymer", is preferably 0.1 to 20, more preferably 0.3 to 12, and still more preferably 0.5 to 10. When the ratio is within preferable range mentioned above, there is an advantage that emulsification stability and viscosity stability can be simultaneously achieved. When the first agent satisfies the above condition (A), since the first agent is blended with an amphoteric polymer and a cationic polymer, the value of the ratio does not become 0.

[0140]

The first agent is preferably blended with one, or two or more selected from resorcin, and inclusion complexes with saccharides such as cyclodextrin of resorcin, and more preferably resorcin. The resorcin is also a coupler, and stability of emulsion of the first agent is more improved by using in combination with an amphoteric polymer and a cationic polymer. The present application also provide a method for stabilizing the dosage form of the first agent, particularly a method for stabilizing an emulsion.

[0141]

The amount of one, or two or more selected from the resorcin, and resorcin inclusion complexes with saccharides blended in the first agent is preferably 0.2 to 1.0% by mass, and more preferably 0.3 to 0.8% by mass. When the amount is within preferable range mentioned above, satisfactory stability of emulsion and level dyeability are obtained while securing viscosity stability.

[0142]

The first agent may be blended with a surfactant. Examples of the surfactant include a nonionic surfactant, a cationic surfactant, an anionic surfactant, and an amphoteric surfactant. One, or two or more of these surfactants may be used. The same shall apply to the following specific examples. Of these, the first agent is preferably blended with a nonionic surfactant and a cationic surfactant.

[0143]

When the first agent does not satisfy the above condition (A), the first agent can be blended with an appropriate component, including the above-mentioned compounds under the condition that the effect of the present invention. It is also possible to appropriately employ the above-mentioned preferable conditions.

[0144]

- Second Agent -

The second agent is blended with an oxidizing agent. The second agent may satisfy the above condition (A). It is also preferable to satisfy one, or two or more of the below-mentioned conditions.

[0145]

The viscosity of the second agent is preferably 2,000 mPa·s or less, and more preferably 50 to 1,500 mPa·s. When the viscosity of the second agent is within preferable range mentioned above, there is a merit such as an improvement in operability during applying. When the second agent satisfies the above condition (A), the viscosity of the second agent becomes 2,000 mPa·s or less, thus enabling employment of the above preferable viscosity.

[0146]

The dosage form of the second agent is preferably an emulsion or a solubilized material, and more preferably an emulsion. When the second agent satisfies the above condition (A), the dosage form of the second agent becomes an emulsion.

[0147]

When the second agent satisfies the above condition (A), with respect to the amphoteric polymer and cationic polymer, it is possible to appropriately employ one, or two or more of conditions such as component, blending amount, and mass ratio described in the above first agent.

[0148]

- Mixing Ratio of Each Agent in the case of Plural Agents-Type -

In the case of a plural agents-type/aerosol-type foamy oxidative hair dye composition, a mixing ratio of plural agents containing the first agent and the second agent can be appropriately determined. A mixing ratio of the first agent to the second agent, first agent:second agent, is preferably 1:5 to 5:1. The mixture preferably has the pH of 7 to 12.

[0149]

As mentioned above, the present application also discloses a hair dyeing method using an aerosol-type foamy oxidative hair dye composition.

[0150]

The present application also discloses an aerosol-type foamy oxidative hair dye, and a product containing, as constituents, a propellant and an aerosol container.

Examples

[0151]

Example will be described below. The technical scope of an aerosol-type foamy oxidative hair dye composition disclosed by the present application is not limited to Examples. The evaluation results are shown in tables, corresponding to the respective Examples.

[0152]

- Regarding Group of Ist Invention -

<Preparation of Aerosol-Type Foamy Oxidative Hair Dye Composition>

[Examples I-1 to I-46]

The respective components shown in Tables 1 to 5 were blended to prepare stock solutions for first agent and stock solutions for second agent of Examples I-1 to I-46. Units of numerical values showing blending amounts in Tables 1 to 5 are % by mass. Balance of purified water in Examples means a balance on the assumption that each proportion of the stock solution for first agent and the proportion of the stock solution for second agent of the respective Examples is 100% by mass.

[0153]

Furthermore, an aerosol container with a simultaneous mixing and discharging mechanism mentioned in Patent Document 2 was filled with the stock solution for first agent and the stock solution for second agent of the respective Examples so that the amount of each stock solution becomes 50 g in a state of being filled with a propellant, and then filled with a propellant (LPG) in each mass ratio shown in Tables 1 to 5 to prepare first agents and second agents of the respective Examples.

[0154]

The first agents and second agents of the respective Examples were discharged from the aerosol container to obtain

aerosol-type foamy oxidative hair dye compositions of Examples I-1 to I-46.

[0155]

[Comparative Examples I-1 to I-4]

The respective components shown in Table 6 were blended to prepare stock solutions for first agent and stock solutions for second agent of Comparative Examples I-1 to I-4. Units of numerical values showing blending amounts in Table 6 are % by mass. Balance of purified water in Comparative Examples means a balance on the assumption that each proportion of the stock solution for first agent and the proportion of the stock solution for second agent of the respective Comparative Examples is 100% by mass.

[0156]

Furthermore, an aerosol container with a simultaneous mixing and discharging mechanism mentioned in Patent Document 2 was filled with the stock solution for first agent and the stock solution for second agent of the respective Comparative Examples so that the amount of each stock solution becomes 50 g in a state of being filled with a propellant, and then filled with a propellant (LPG) in each mass ratio shown in Table 6 to prepare first agents and second agents of the respective Comparative Examples.

[0157]

The first agents and second agents of the respective Comparative Examples were discharged from the aerosol container to obtain aerosol-type foamy oxidative hair dye compositions of Comparative Examples I-1 to I-4.

[0158]

<Measurement Foam Specific Gravity>

Each of the compositions of Examples I-1 to I-46 and Comparative Examples I-1 to I-4 was discharged from the above aerosol container in the amount of 5 g, and a first agent and a second agent were mixed by hands. After filling 30 ml of a cylindrical measuring cup with the obtained mixture up to the maximum level, the mass of foam was measured and then divided by the volume to give an initial foam specific gravity of the mixture.

[0159]

Each of the compositions of Examples I-1 to I-46 and Comparative Examples I-1 to I-4 was discharged from the above aerosol container in the amount of 15 g, and a first agent and a second agent were mixed by hands. The total amount of the mixture was continuously applied by hands to 1 g of a white hair bundle having a length of 10 cm (hereinafter simply referred to as a “hair bundle”) for 5 minutes. After the applying operation for 5 minutes, a 30 ml cylindrical measuring cup was filled with the mixture remained on the hair after the applying operation up to the maximum level and the mass of foam was

measured and then divided by the volume to give a foam specific gravity of foam which is the mixture after 5 minutes (referred to as a “foam specific gravity measured after 5 minutes”).

[0160]

The aerosol-type foamy oxidative hair dye composition used for the measurement was used on the next day after filling, and used after well shaking, filling and discharging first.

[0161]

<Measurement of Proper Application Amount>

Each of the compositions of Examples I-1 to I-46 and Comparative Examples I-1 to I-4 was discharged from the above aerosol container in the amount of 6 g on a tray, followed by mixing. The mixture was applied to 3 g of a hair bundle by hands on the tray. After judging completion of sufficient application, the hair bundle was removed from the tray and the mass of the remaining mixture was measured. A difference between 6 g of the composition discharged at first and the mass of the remaining mixture was regarded as a proper applying amount (g).

[0162]

<Hair Dyeing Treatment in Evaluation 1 and Evaluation 2 mentioned below>

Each of the compositions of Examples I-1 to I-46 and Comparative Examples I-1 to I-4 was discharged from the above aerosol container in the amount of 15 g, followed by mixing.

The mixture was applied to 3 g of a hair bundle having a length of 30 cm by hands, and the hair bundle was left to stand in a constant temperature bath (30°C) for 30 minutes. The composition adhered to the hair bundle was washed with water, and then treated in turn with shampoo and rinse (conditioner) once for each treatment. Subsequently, the hair bundle was dried by warm air. In this way, the hair bundle was subjected to a hair dyeing treatment using the composition.

[0163]

<Evaluation 1: Ease of Application>

In a hair dyeing treatment using each of the compositions of Examples I-1 to I-46 and Comparative Example I-1 to I-4, 10 panelists visually observed during an applying operation, from the viewpoints of suppression of dropping of mass of foam, suppression of scattering of splashing of foam, and satisfactory extension of foam, and then evaluated (sensory evaluation) whether or not the composition is easy to apply according to overall evaluation of three items mentioned above. Evaluation criteria are as follows.

5: Seven or more panelists of 10 panelists rated “excellent”.

4: Five to six panelists of 10 panelists rated “excellent”.

3: Three to four panelists of 10 panelists rated “excellent”.

2: Two panelists of 10 panelists rated “excellent”.

1: One or less panelist of 10 panelists rated “excellent”.

[0164]

<Evaluation 2: Less Dripping>

In a hair dyeing treatment using each of the compositions of Examples I-1 to I-46 and Comparative Example I-1 to I-4, 10 panelists visually observed dripping due to liquefaction of foam and dripping of foam itself during standing in a constant temperature bath, and then evaluated (sensory evaluation) less dripping.

Evaluation criteria are as follows.

5: Seven or more panelists of 10 panelists rated “excellent”.

4: Five to six panelists of 10 panelists rated “excellent”.

3: Three to four panelists of 10 panelists rated “excellent”.

2: Two panelists of 10 panelists rated “excellent”.

1: One or less panelist of 10 panelists rated “excellent”.

[0165]

<Evaluation 3: Level Dyeability>

Each of the compositions of Examples I-1 to I-46 and Comparative Examples I-1 to I-4 was discharged from the above aerosol container in the amount of 15 g on a tray, followed by mixing. On the tray, 3 g of a hair bundle having a length of

30 cm was placed and the mixture was applied by hands through combing from a tip to an end direction 10 times, and the hair bundle was left to stand in a constant temperature bath (30°C) for 30 minutes. The composition adhered to the hair bundle was washed with water, and then treated in turn with shampoo and rinse (conditioner) once for each treatment. Subsequently, the hair bundle was dried by warm air.

Then, 10 panelists visually observed the degree of color unevenness of the hair bundle, and then evaluated (sensory evaluation) whether or not the color unevenness exists. Specifically, the case where "dyeing is completed without unevenness" was rated "5", the case where "dyeing is completed with almost no unevenness" was rated "4", the case where "dyeing is completed with slight unevenness" was rated "3", the case where "dyeing is completed with numerous unevenness" was rated "2", and the case where "dyeing is completed with severe unevenness" was rated "1", respectively. The thus obtained average score of evaluation of 10 panelists every each item for evaluation was calculated. If the average score includes a figure of a decimal point or less, evaluation was determined by performing rounding off.

[0166]

<Evaluation 4: Hair Dyeing Power when applying in Proper Amount>

The hair bundle, which was judged that a mixture was sufficiently applied, in the above "measurement of proper

applying amount”, was left to stand in a constant temperature bath (30°C) for 30 minutes. The composition adhered to the hair bundle was washed with water, and then treated in turn with shampoo and rinse (conditioner) once for each treatment. Subsequently, the hair bundle was dried by warm air.

Then, 10 panelists visually observed the hair bundle, and evaluated (sensory evaluation) whether or not a hair dyeing power is satisfactory. Specifically, the case where “hair dyeing power is excellent” was rated “5”, the case where “hair dyeing power is somewhat excellent” was rated “4”, the case where “hair dyeing power is ordinary” was rated “3”, the case where “hair dyeing power is slightly poor” was rated “2”, and the case where “hair dyeing power is poor” was rated “1”, respectively. The thus obtained average score of evaluation of 10 panelists every each item for evaluation was calculated. If the average score includes a figure of a decimal point or less, evaluation was determined by performing rounding off.

[0167]

<Evaluation 5: Foamability>

Each of the compositions of Examples I-1 to I-46 and Comparative Examples I-1 to I-4 was discharged from the above aerosol container in the amount of 3 g on a flat plate under the condition of 25°C. Immediately after discharging, 10 panelists visually evaluated (sensory evaluation) bulkiness of foam (foamability).

All compositions of Examples I-1 to I-46 exhibited satisfactory formability. Many panelists evaluated that the compositions of Examples I-15 and I-16 are particularly "bulky", and they exhibited more excellent foamability. It was omitted to fill these test results into tables.

[0168]

A table filling method will be described below. Numeral put in brankets at the right of a higher alcohol shows the number of carbon atoms of the higher alcohol. The numeral put in brankets, which follows POE of the nonionic surfactant, shows the polymerization degree of POE. In the table, the formulation (% by mass) of a first agent and a second agent as stock solutions, and a filling ratio of the stock solution to a propellant are filled, and a filling ratio of the stock solution to the propellant is a mass ratio. The term "ionic SAA" means an ionic surfactant. The term "solid OH" means a solid higher alcohol. The phrase "ionic SAA/solid OH ratio of mixture" means a mass ratio of an ionic surfactant to a solid higher alcohol in the mixture. Unit of an ammonia solution and a hydrogen peroxide solution is % (w/w).

[0169]

[Table 1]

		Example I-1	Example I-2	Example I-3	Example I-4	Example I-5	Example I-6	Example I-7	Example I-8	Example I-9
First agent	Cetanol (16)	0.7	0.5		0.3	0.7	0.7	0.7	0.7	0.7
	Hexyldecanol (16)		0.2							
	Stearyl alcohol (18)			0.7						
	Behenyl alcohol (22)	0.3	0.3	0.3	0.7	0.3	0.3	0.3	0.3	0.3
	POE(10) lauryl ether	1.5	1.5	1.5	1.5		1.5	1.5	1.5	1.5
	POE(30) lauryl ether					1.5				
	POE(10) cetyl ether	1	1	1	1	1		1	1	1
	POE(10) stearyl ether						1			
	Stearyltrimethylammonium chloride	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Lauryltrimethylammonium chloride									
	POE(10) sodium lauryl sulfate									
	Lauryldimethylaminoacetic acid betaine									
	Glycerol	2	2	2	2	2	2		2	2
	PEG400							2		
	Liquid paraffin									
	Olive oil	3	3	3	3	3	3	3	3	3
	Lanolin									
	Liquid isoparaffin									
	Isopropyl myristate									
	28% Ammonia solution	4	4	4	4	4	4	4		
	Ammonium hydrogen carbonate								4	
	Ammonium carbonate									4
	Na sulfite	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	5Na diethylenetriaminepentaacetate	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Para-toluylenediamine	1	1	1	1	1	1	1	1	1
	Resorcin	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Para-aminophenol	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Meta-aminophenol	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	5-Aminocresol	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5
Second agent	Myristyl alcohol (14)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Cetanol (16)	1	1	1	1	1	1	1	1	1
	Stearyl alcohol (18)									
	Behenyl alcohol (22)									
	POE(10) lauryl ether	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	POE(30) cetyl ether	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	POE(10) oleyl ether									
	Stearyltrimethylammonium chloride	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	POE(10) sodium lauryl sulfate									
	Lauryldimethylaminoacetic acid betaine									
	35% Hydrogen peroxide solution	5	5	5	5	5	5	5	5	5
	Hydroxyethanediphosphonic acid	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	4Na hydroxyethanediphosphonate	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Phenoxyethanol	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5
	Initial foam specific gravity of mixed foam	0.070	0.065	0.070	0.070	0.070	0.070	0.070	0.070	0.070
	Foam specific gravity after 5 minutes	0.075	0.070	0.075	0.075	0.075	0.075	0.075	0.075	0.075
	Rate of change in foam specific gravity	107%	108%	107%	107%	107%	107%	107%	107%	107%
	Oily component in mixture	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Ionic SAA in mixture	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
	Ionic SAA/solid OH ratio	0.318182	0.35	0.318182	0.318182	0.318182	0.318182	0.318182	0.318182	0.318182
	Proper coating amount (g)/3 g of hair bundle	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g
	Ease of application	5	5	5	5	5	5	5	5	5
	Less dripping	5	5	5	5	5	5	5	5	5
	Level dyeability	5	5	5	5	5	5	5	5	5
	Hair dyeing power when applying in proper amount	5	5	5	5	5	5	5	5	5

[0170]

[Table 2]

		Example I-10	Example I-11	Example I-12	Example I-13	Example I-14	Example I-15	Example I-16	Example I-17	Example I-18
First agent	Cetanol (16)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	Hexyldecanol (16)									
	Stearyl alcohol (18)									
	Behenyl alcohol (22)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	POE(10) lauryl ether	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	POE(30) lauryl ether									
	POE(10) cetyl ether	1	1	1	1	1	1	1	1	1
	POE(10) stearyl ether									
	Stearyltrimethylammonium chloride	0.5	0.5	0.5	0.5	0.5				0.5
	Lauryltrimethylammonium chloride						0.5			
	POE(10) sodium lauryl sulfate							0.5		
	Lauryldimethylaminoacetic acid betaine								0.5	
	Glycerol	2	2	2	2	2	2	2	2	2
	PEG400									
	Liquid paraffin									3
	Olive oil	3	3	3	3	3	3	3	3	
	Lanolin									
	Liquid isoparaffin									
	Isopropyl myristate									
	28% Ammonia solution	4	4	4	4	4	4	4	4	4
	Ammonium hydrogen carbonate									
	Ammonium carbonate									
	Na sulfite	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	5Na diethylenetriaminepentaacetate	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Para-toluylenediamine	1	1	1	1	1	1	1	1	1
	Resorcin	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Para-aminophenol	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Meta-aminophenol	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	5-Aminocresol	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5
Second agent	Myristyl alcohol (14)	0.2	0.5	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Cetanol (16)		0.7		1	1	1	1	1	1
	Stearyl alcohol (18)	1								
	Behenyl alcohol (22)			1						
	POE(10) lauryl ether	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5
	POE(30) cetyl ether	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5
	POE(10) oleyl ether					0.5				
	Stearyltrimethylammonium chloride	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	POE(10) sodium lauryl sulfate									
	Lauryldimethylaminoacetic acid betaine									
	35% Hydrogen peroxide solution	5	5	5	5	5	5	5	5	5
	Hydroxyethanediphosphonic acid	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	4Na hydroxyethanediphosphonate	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Phenoxyethanol	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5
	Initial foam specific gravity of mixed foam	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070	0.070
	Foam specific gravity after 5 minutes	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075	0.075
	Rate of change in foam specific gravity	107%	107%	107%	107%	107%	107%	107%	107%	107%
	Oily component in mixture	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Ionic SAA in mixture	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
	Ionic SAA/solid OH ratio	0.318182	0.318182	0.318182	0.318182	0.318182	0.090909	0.318182	0.318182	0.318182
	Proper coating amount (g)/3 g of hair bundle	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g
	Ease of application	5	5	5	5	5	5	5	5	5
	Less dripping	5	5	5	5	5	5	5	5	5
	Level dyeability	5	5	5	5	5	5	5	5	5
	Hair dyeing power when applying in proper amount	5	5	5	5	5	5	5	5	5

[0171]

[Table 3]

		Example I-19	Example I-20	Example I-21	Example I-22	Example I-23	Example I-24	Example I-25	Example I-26	Example I-27	Example I-28
First agent	Cetanol (16)	0.7	0.7	0.7	0.7	0.7	0.2	0.5	0.8	1	1.2
	Hexyldecanol (16)										
	Stearyl alcohol (18)										
	Behenyl alcohol (22)	0.3	0.3	0.3	0.3	0.3	0.1	0.3	0.3	0.3	0.3
	POE(10) lauryl ether	1.5	1.5	1.5	1.5	1.5	2.5	1.5	1	1	1
	POE(30) lauryl ether										
	POE(10) cetyl ether	1	1	1	1	1	0.5	1	1	1	1.5
	POE(10) stearyl ether										
	Stearyltrimethylammonium chloride	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Lauryltrimethylammonium chloride										
	POE(10) sodium lauryl sulfate										
	Lauryldimethylaminoacetic acid betaine										
	Glycerol	2	2	2	2	2	2	2	2	2	2
	PEG400										
	Liquid paraffin										
	Olive oil				3	3	3	3	3	3	3
	Lanolin	3									
	Liquid isoparaffin		3								
	Isopropyl myristate			3							
	28% Ammonia solution	4	4	4	4	4	4	4	4	4	4
	Ammonium hydrogen carbonate										
	Ammonium carbonate										
	Na sulfite	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	5Na diethylenetriaminepentaacetate	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Para-toluylenediamine	1	1	1	1	1	1	1	1	1	1
	Resorcin	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Para-aminophenol	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Meta-aminophenol	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	5-Aminocresol	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5
Second agent	Myristyl alcohol (14)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Cetanol (16)	1	1	1	1	1	0.3	0.5	1	1	1.2
	Stearyl alcohol (18)										
	Behenyl alcohol (22)										
	POE(10) lauryl ether	0.5	0.5	0.5	0.5	0.5	1	0.5	0.5	0.5	0.5
	POE(30) cetyl ether	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1
	POE(10) oleyl ether										
	Stearyltrimethylammonium chloride	0.2	0.2	0.2			0.2	0.2	0.2	0.2	0.2
	POE(10) sodium lauryl sulfate				0.2						
	Lauryldimethylaminoacetic acid betaine					0.2					
	35% Hydrogen peroxide solution	5	5	5	5	5	5	5	5	5	5
	Hydroxyethanediphosphonic acid	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	4Na hydroxyethanediphosphonate	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Phenoxyethanol	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5
	Initial foam specific gravity of mixed foam	0.070	0.070	0.070	0.070	0.070	0.035	0.050	0.090	0.110	0.160
	Foam specific gravity after 5 minutes	0.075	0.075	0.075	0.075	0.075	0.045	0.055	0.095	0.125	0.170
	Rate of change in foam specific gravity	107%	107%	107%	107%	107%	129%	110%	106%	114%	106%
	Oily component in mixture	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Ionic SAA in mixture	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
	Ionic SAA/solid OH ratio	0.318182	0.318182	0.318182	0.318182	0.318182	0.875	0.466667	0.304348	0.28	0.241379
	Proper coating amount (g)/3 g of hair bundle	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g	3.0g	4.0g	4.5g	4.5g	5.0g
	Ease of application	5	5	5	5	5	5	5	5	4	3
	Less dripping	5	5	5	5	5	5	5	5	5	4
	Level dyeability	5	5	5	5	5	5	5	5	5	5
	Hair dyeing power when applying in proper amount	5	5	5	5	5	4	5	5	5	5

[0172]

[Table 4]

		Example I-29	Example I-30	Example I-31	Example I-32	Example I-33	Example I-34	Example I-35	Example I-36	Example I-37	Example I-38
First agent	Cetanol (16)	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	Hexyldecanol (16)										
	Stearyl alcohol (18)										
	Behenyl alcohol (22)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	POE(10) lauryl ether	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	POE(30) lauryl ether										
	POE(10) cetyl ether	1	1	1	1	1	1	1	1	1	1
	POE(10) stearyl ether										
	Stearyltrimethylammonium chloride	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Lauryltrimethylammonium chloride										
	POE(10) sodium lauryl sulfate										
	Lauryldimethylaminoacetic acid betaine										
	Glycerol	2	2	2	2	2	2	2	2	2	2
	PEG400										
	Liquid paraffin										
	Olive oil	3	3	3	3	3	0	5	9	15	22
	Lanolin										
	Liquid isoparaffin										
	Isopropyl myristate										
	28% Ammonia solution	4	4	4	4	4	4	4	4	4	4
	Ammonium hydrogen carbonate										
	Ammonium carbonate										
	Na sulfite	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	5Na diethylenetriaminepentaacetate	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Para-toluylenediamine	1	1	1	1	1	1	1	1	1	1
	Resorcin	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Para-aminophenol	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Meta-aminophenol	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	5-Aminocresol	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	92:8	97:3	92:8	90:10	97:3	95:5	95:5	95:5	95:5	95:5
Second agent	Myristyl alcohol (14)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Cetanol (16)	1	1	1	1	1	1	1	1	1	1
	Stearyl alcohol (18)										
	Behenyl alcohol (22)										
	POE(10) lauryl ether	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	POE(30) cetyl ether	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	POE(10) oleyl ether										
	Stearyltrimethylammonium chloride	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	POE(10) sodium lauryl sulfate										
	Lauryldimethylaminoacetic acid betaine										
	35% Hydrogen peroxide solution	5	5	5	5	5	5	5	5	5	5
	Hydroxyethanediphosphonic acid	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	4Na hydroxyethanediphosphonate	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Phenoxyethanol	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	92:8	90:10	97:3	95:5	95:5	95:5	95:5	95:5
	Initial foam specific gravity of mixed foam	0.065	0.075	0.050	0.040	0.140	0.070	0.070	0.070	0.070	0.070
	Foam specific gravity after 5 minutes	0.065	0.075	0.065	0.055	0.160	0.075	0.075	0.085	0.095	0.100
	Rate of change in foam specific gravity	100%	100%	130%	138%	114%	107%	107%	121%	136%	143%
	Oily component in mixture	1.5	1.5	1.5	1.5	1.5	0	2.5	4.5	7.5	11
	Ionic SAA in mixture	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
	Ionic SAA/solid OH ratio	0.318182	0.318182	0.318182	0.318182	0.318182	0.318182	0.318182	0.318182	0.318182	0.318182
	Proper coating amount (g)/3 g of hair bundle	4.5 g	4.5 g	4.0 g	4.0 g	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g	4.5 g
	Ease of application	5	5	5	5	4	5	5	5	5	5
	Less dripping	5	5	4	4	4	5	5	5	4	3
	Level dyeability	5	5	5	5	4	5	5	5	5	4
	Hair dyeing power when applying in proper amount	5	5	4	4	5	5	5	5	5	5

[0173]

[Table 5]

		Example I-39	Example I-40	Example I-41	Example I-42	Example I-43	Example I-44	Example I-45	Example I-46
First agent	Cetanol (16)	0.7	1	1.2	1.5	0.7	0.7	0.7	1.2
	Hexyldecanol (16)								
	Stearyl alcohol (18)								
	Behenyl alcohol (22)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	POE(10) lauryl ether	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	POE(30) lauryl ether								
	POE(10) cetyl ether	1	1	1	1	1	1	1	1
	POE(10) stearyl ether								
	Stearyltrimethylammonium chloride	0	3	5	8	0.5	0.5	0.5	5
	Lauryltrimethylammonium chloride								
	POE(10) sodium lauryl sulfate								
	Lauryldimethylaminoacetic acid betaine								
	Glycerol	2	2	2	2	2	2	2	2
	PEG400								
	Liquid paraffin								
	Olive oil	3	3	3	3	3	3	3	3
	Lanolin								
	Liquid isoparaffin								
	Isopropyl myristate								
	28% Ammonia solution	4	4	4	4	4	4	4	4
	Ammonium hydrogen carbonate								
	Ammonium carbonate								
	Na sulfite	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	5Na diethylenetriaminepentaacetate	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
	Para-toluylenediamine	1	1	1	1	1	1	1	1
	Resorcin	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Para-aminophenol	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Meta-aminophenol	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	5-Aminocresol	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5
Second agent	Myristyl alcohol (14)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Cetanol (16)	1	1	1	1	1	1.2	1.5	1.2
	Stearyl alcohol (18)								
	Behenyl alcohol (22)								
	POE(10) lauryl ether	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	POE(30) cetyl ether	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	POE(10) oleyl ether								
	Stearyltrimethylammonium chloride	0.2	0.2	0.2	0.2	0	5	8	5
	POE(10) sodium lauryl sulfate								
	Lauryldimethylaminoacetic acid betaine								
	35% Hydrogen peroxide solution	5	5	5	5	5	5	5	5
	Hydroxyethanediphosphonic acid	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	4Na hydroxyethanediphosphonate	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Phenoxyethanol	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5
	Initial foam specific gravity of mixed foam	0.070	0.065	0.050	0.040	0.070	0.050	0.040	0.035
	Foam specific gravity after 5 minutes	0.075	0.065	0.050	0.040	0.075	0.050	0.040	0.035
	Rate of change in foam specific gravity	107%	100%	100%	100%	107%	100%	100%	100%
	Oily component in mixture	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	Ionic SAA in mixture	0.1	1.6	2.6	4.1	0.25	2.75	4.25	5
	Ionic SAA/solid OH ratio	0.090909	1.28	1.925926	2.733333	0.227273	2.291667	3.148148	3.448276
	Proper coating amount (g)/3 g of hair bundle	4.5 g	4.5 g	4.0 g	3.5 g	4.5 g	4.0g	3.5g	3.0g
	Ease of application	5	5	5	5	5	5	5	4
	Less dripping	5	5	5	5	5	5	5	5
	Level dyeability	5	5	5	4	5	5	4	5
	Hair dyeing power when applying in proper amount	5	5	5	3	5	4	3	3

[0174]

[Table 6]

		Comparative Example I-1	Comparative Example I-2	Comparative Example I-3	Comparative Example I-4
First agent	Cetanol (16)	0.1	1	0.7	0.2
	Hexyldecanol (16)				
	Stearyl alcohol (18)				
	Behenyl alcohol (22)	0.1	0.5	0.3	0.3
	POE(10) lauryl ether	2.5	1.5	1.5	0.1
	POE(30) lauryl ether				
	POE(10) cetyl ether	1	1	1	0.1
	POE(10) stearyl ether				
	Stearyltrimethylammonium chloride	0.5	0.5	10	0.1
	Lauryltrimethylammonium chloride				
	POE(10) sodium lauryl sulfate				
	Lauryldimethylaminoacetic acid betaine				
	Glycerol	2	2	2	2
	PEG400				
	Liquid paraffin				
	Olive oil	3	3	3	3
	Lanolin				
	Liquid isoparaffin				
	Isopropyl myristate				
	28% Ammonia solution	4	4	4	4
	Ammonium hydrogen carbonate				
	Ammonium carbonate				
	Na sulfite	0.3	0.3	0.3	0.3
	5Na diethylenetriaminepentaacetate	0.3	0.3	0.3	0.3
	Para-toluylenediamine	1	1	1	1
	Resorcin	0.5	0.5	0.5	0.5
	Para-aminophenol	0.1	0.1	0.1	0.1
	Meta-aminophenol	0.2	0.2	0.2	0.2
	5-Aminocresol	0.07	0.07	0.07	0.07
	Purified water	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5
Second agent	Myristyl alcohol (14)	0.1	0.5	0.2	0.2
	Cetanol (16)	0.1	1.5	1	0.5
	Stearyl alcohol (18)				
	Behenyl alcohol (22)				
	POE(10) lauryl ether	1.5	0.5	0.5	0.1
	POE(30) cetyl ether	0.5	0.5	0.5	0.1
	POE(10) oleyl ether				
	Stearyltrimethylammonium chloride	0.2	0.2	10	0.1
	POE(10) sodium lauryl sulfate				
	Lauryldimethylaminoacetic acid betaine				
	35% Hydrogen peroxide solution	5	5	5	5
	Hydroxyethanediphosphonic acid	0.1	0.1	0.1	0.1
	4Na hydroxyethanediphosphonate	0.2	0.2	0.2	0.2
	Phenoxyethanol	0.1	0.1	0.1	0.1
	Purified water	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5
	Initial foam specific gravity of mixed foam	0.020	0.200	0.070	0.070
	Foam specific gravity after 5 minutes	0.020	0.200	0.055	0.110
	Rate of change in foam specific gravity	100%	100%	79%	157%
	Oily component in mixture	1.5	1.5	1.5	1.5
	Ionic SAA in mixture	0.35	0.35	10	0.1
	Ionic SAA/solid OH ratio	1.75	0.2	9.090909	0.166667
	Proper coating amount (g)/3 g of hair bundle	1.5 g	6.0 g	2.0 g	5.0 g
	Ease of application	2	1	5	5
	Less dripping	5	3	4	1
	Level dyeability	3	3	3	1
	Hair dyeing power when applying in proper amount	1	5	1	3

[0175]

A relation between the foam specific gravity and the visually observation will be described by way of the following test photographs.

[Test Photographs]

[0176]

Test photographs at the top are photographs of a test in which a mixture having a rate of change in foam specific gravity of 100 to 150% was applied. Test photographs at the middle are photographs of a test in which a mixture having a rate of change in foam specific gravity of more than 150% was applied (defoaming formulation). Test photographs at the bottom are photographs of a test in which a mixture having a rate of change in foam specific gravity of less than 100% was applied (foam increasing formulation).

[0177]

The test photograph at the left side "proper applying" shows the hair to which a mixture was applied over 5 minutes in the amount which is visually considered to sufficient. The test photograph at the middle side "foam state during mixing" shows a state of foam immediately after mixing a first agent and a second agent. The test photograph at the right side "foam state after applying" shows the photograph in which a mixture

was applied over 5 minutes and then foam remaining on the hair was collected.

[0178]

The mixture having a rate of change in foam specific gravity of 100 to 150% could be applied uniformly over the hair bundle since bulkiness was maintained within a given range during an applying operation. Regarding the mixtures of foam increasing formulation and defoaming formulation, bulkiness varied during an applying operation, thus leaving a move trace of hands. In the applying operation, it was difficult to arrange foam at the root and tip of a hair bundle.

[0179]

Although the photograph is not shown, the mixture of Comparative Example I-1 exhibits large bulkiness, thus requiring small weight needed for achieving proper application. Meanwhile, the mixture of Comparative Example I-2 exhibits small bulkiness, thus requiring large weight needed for achieving proper application.

[0180]

In the above test, the rate of change in foam specific gravity was determined from (i) the initial foam specific gravity of foam before applying to the hairs and (ii) the foam specific gravity determined from foam collected after performing an applying operation to the hair. There was a correlation between the rate of change in foam specific gravity

and the satisfactory effect. Therefore, it is considered to be sufficient that the foam specific gravity of foam measured 5 minutes after mixing is determined from foam collected from the hair subjected to the applying operation.

[0181]

- Regarding IInd Invention Group -

<Preparation of Aerosol-Type Foamy Oxidative Hair Dye Composition>

[Examples II-1 to II-38]

The respective components shown in Table 7 to Table 10 and Table 12 were blended to prepare stock solutions for first agent and stock solutions for second agent of Examples II-1 to II-38 as emulsions. Units of the numerical value showing the blending amount in Table 7 to Table 10 and Table 12 are % by mass. "Balance" of purified water in Examples means balance on the assumption that the amounts of stock solutions for first agent and stock solutions for second agent of the respective Examples are regarded as 100% by mass.

[0182]

Furthermore, an aerosol container with a simultaneous mixing and discharging mechanism was filled with stock solutions for first agent and stock solutions for second agent of the respective Examples and then filled with a propellant (LPG) in each mass ratio shown in Table 7 to Table 10 and Table

12 to prepare first agents and second agents of the respective Examples.

[0183]

First agents and second agents of the respective Examples were discharged from this aerosol container to obtain aerosol-type foamy oxidative hair dye compositions of Examples II-1 to II-38.

First agents and second agents of the respective Examples are emulsions.

[0184]

[Comparative Examples II-1 to II-4]

The respective components shown in Table 11 and Table 12 were blended to prepare stock solutions for first agent and stock solutions for second agent of Comparative Examples II-1 to II-4 as emulsions. Units of the numerical value showing the blending amount in Table 11 and Table 12 are % by mass. "Balance" of purified water in Comparative Examples means balance on the assumption that the amounts of stock solutions for first agent and stock solutions for second agent of the respective Comparative Examples are regarded as 100% by mass.

[0185]

Furthermore, an aerosol container with a simultaneous mixing and discharging mechanism was filled with stock solutions for first agent and stock solutions for second agent of the respective Examples and then filled with a propellant

(LPG) in each mass ratio shown in Table 11 and Table 12 to prepare first agents and second agents of the respective Examples.

[0186]

First agents and second agents of the respective Examples were discharged from this aerosol container to obtain aerosol-type foamy oxidative hair dye compositions of Comparative Examples II-1 to II-4.

First agents and second agents of the respective Comparative Examples are emulsions.

[0187]

(Stability Test of Emulsion)

Test method: Stock solution for first agents of the respective Examples were stored in a constant temperature bath at 60°C.

Evaluation method: It was visually confirmed whether or not an emulsion is separated, and evaluation was performed by the number of days required until an emulsion is separated.

[0188]

Evaluation criteria: The case required to separate an emulsion was one or more weeks was rated "5", the case required to separate an emulsion was 3 days or more and less than one week was rated "4", the case required to separate an emulsion was one or more days and less than 3 days was rated "3", the case required to separate an emulsion was 12 or more hours and

less than one day was rated “2”, and the case required to separate an emulsion was less than 12 hours was rated “1”, respectively.

[0189]

The above-mentioned test is an acceleration test. Therefore, it is reasonably estimated that when the acceleration test show satisfactory results, satisfactory effect can be obtained even if a first agent filled with a propellant is stored in an aerosol container at normal temperature.

[0190]

(Viscosity Stability Test)

Test method: Stock solutions for first agent of the respective Examples were prepared and then stored in a constant temperature tank at 50°C for one month. The viscosity of the stock solution for first agent immediately after preparation, and that of the stock solution for first agent after storage for one month were measured by a B-type viscometer under the conditions (rotor No. 2, rotating speed of 12 rpm, 25°C, one minute). In the column “viscosity” in the table, the measurement results immediately after preparation are shown.

[0191]

Evaluation method: A viscosity ratio (viscosity ratio = viscosity after storage for one month/viscosity immediately after preparation) was calculated from the viscosity of a stock solution for first agent immediately after preparation and the

viscosity of a stock solution for first agent after storage for one month. This viscosity ratio shows that stability of the viscosity during storage becomes excellent as the viscosity ratio approaches 1.

[0192]

Evaluation criteria: The case where a viscosity ratio is 0.80 or more and less than 1.20 was rated "5", the case where a viscosity ratio is 0.60 or more and less than 0.80 or 1.2 or more and less than 2.0 was rated "4", the case where a viscosity ratio is 0.40 or more and less than 0.60 or 2.0 or more and less than 3.0 was rated "3", the case where a viscosity ratio is 0.20 or more and less than 0.40 or 3.0 or more and less than 4.0 was rated "2", and the case where a viscosity ratio is less than 0.20 or 4.0 or more was rated "1", respectively.

[0193]

The above-mentioned test is an acceleration test. Therefore, it is reasonably estimated that when the acceleration test show satisfactory results, satisfactory effect can be obtained even if a first agent filled with a propellant is stored in an aerosol container at normal temperature.

[0194]

(Level Dyeability Test)

Each of the compositions of Examples II-1 to II-38 and Comparative Examples II-1 to II-4 was discharged from the above

aerosol container in the total amount of 10 g, and 3 g of a white hair bundle having a length of 30 cm (hereinafter simply referred to as a "hair bundle") was combed by hands from a tip to an end direction 10 times, and the hair bundle was left to stand in a constant temperature bath (30°C) for 30 minutes. The composition adhered to the hair bundle was washed with water, and then treated in turn with shampoo and rinse (conditioner) once for each treatment. Subsequently, the hair bundle was dried by warm air. In this way, the hair bundle was subjected to a hair dyeing treatment using the composition. Then, 10 panelists visually observed the degree of color unevenness of the hair bundle, and then evaluated (sensory evaluation) whether or not the color unevenness exists.

Specifically, the case where "dyeing is completed without unevenness" was rated "5", the case where "dyeing is completed with almost no unevenness" was rated "4", the case where "dyeing is completed with slight unevenness" was rated "3", the case where "dyeing is completed with numerous unevenness" was rated "2", and the case where "dyeing is completed with severe unevenness" was rated "1", respectively. The thus obtained average score of evaluation of 10 panelists every each item for evaluation was calculated. If the average score includes a figure of a decimal point or less, evaluation was determined by performing rounding off. The results are shown in Tables 7 to 11.

[0195]

(Foamability Test)

Each of the compositions of Examples II-1 to II-38 and Comparative Examples II-1 to II-4 was discharged from the above aerosol container in the amount of 3 g on a flat plate under the condition of 25°C. Immediately after discharging, 10 panelists visually evaluated (sensory evaluation) bulkiness of foam (foamability).

All compositions of Examples II-1 to II-38 exhibited satisfactory formability. Many panelists evaluated that the composition of Example II-7 is particularly "bulky", and it exhibited more excellent foamability.

[0196]

A table filling method will be described below. Regarding the component whose product name "MERQUAT XX" is put in brackets, the blending amount of the component was filled in the table. For example, with respect to MERQUAT 100, the blending amount (% by weight) of "polydimethylmethylenepiperidinium chloride" was filled in the table. Numeral put in brankets at the right of a higher alcohol shows the number of carbon atoms of the higher alcohol. The numeral put in brankets, which follows POE of the nonionic surfactant, shows the polymerization degree of POE. The term "28% ammonia" represents a 28% ammonia solution. Units of an ammonia solution and a hydrogen peroxide solution are % (w/w).

A ratio of a stock solution to a propellant is a mass ratio. The term "amphoteric polymer/cationic polymer" means a mass ratio of an amphoteric polymer to a cationic polymer. The term "amount of a polymer" means the total amount of an amphoteric polymer and a cationic polymer in the first agent.

[0197]

[Table 7]

		Example II-1	Example II-2	Example II-3	Example II-4	Example II-5	Example II-6	Example II-7	Example II-8	Example II-9	Example II-10
First agent	Cetanol (16)	1	1	1	1			1	1	1	1
	Hexyldecanol (16)					1					
	Lauryl alcohol (12)						1				
	Acrylamide／acrylic acid／dimethyldiallylammonium chloride copolymer (MERQUAT PLUS 3330)	0.15	0.15	0.15	0.15	0.15	0.15	0.15		0.15	0.15
	Acrylic acid／methacrylamidepropyltrimethylammonium chloride／methylacrylate copolymer (MERQUAT 2001)								0.15		
	Polydimethylmethylenepiperidinum chloride (MERQUAT 100)	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05		
	Hydroxyethylcellulose dimethyldiallyl ammonium chloride									0.05	
	Chlorinated O-[2-hydroxy-3-(trimethylammonio)propyl]hydroxyethyl cellulose										0.05
	Dimethyldiallylammonium chloride/ acrylic acid copolymer (MERQUAT 295)										
	Hydroxyethyl cellulose										
	Resorcin	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	2.6-Diaminopyridine										
	Meta-aminophenol										
	5-Aminocresol										
	Para-aminophenol	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Para-phenylenediamine	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	POE(2) lauryl ether	1.5	1.5		1.5	1.5	1.5	1.5	1.5	1.5	1.5
	POE(30) cetyl ether	1.5		1.5	1.5	1.5	1.5		1.5	1.5	1.5
	POE(50) oleyl ether			1.5							
	Stearyltrimethylammonium chloride		0.5								
	Lauryltrimethylammonium chloride							0.5			
	28% Ammonia	3	3	3	3	3	3	3	3	3	3
	Liquid paraffin		2								
	Polyethylene glycol 400	4	5	4	4	4	4	4	4	4	4
	1,3-Butylene glycol	3	3	3	3	3	3	3	3	3	3
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	93:7	95:5	95:5	95:5	95:5	95:5	95:5
	Amphoteric polymer/cationic polymer	3	3	3	3	3	3	3	3	3	3
	Amount of polymer	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Viscosity (mPa・s)	500	500	500	500	500	500	500	500	500	500
	Emulsion stability	5	5	5	5	5	5	5	5	5	5
	Viscosity stability	5	5	5	5	5	5	5	5	5	5
	Level dyeability	5	5	5	5	5	5	5	5	5	5

[0198]

[Table 8]

		Example II-11	Example II-12	Example II-13	Example II-14	Example II-15	Example II-16	Example II-17	Example II-18	Example II-19	Example II-20
First agent	Cetanol (16)	1	1	1	1	0.5	0.5	1	1	1	1
	Hexyldecanol (16)										
	Lauryl alcohol (12)										
	Acrylamide／acrylic acid／dimethyldiallylammonium chloride copolymer (MERQUAT PLUS 3330)	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
	Acrylic acid／methacrylamidepropyltrimethylammonium chloride／methylacrylate copolymer (MERQUAT 2001)										
	Polydimethylmethylenepiperidinum chloride (MERQUAT 100)		0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
	Hydroxyethylcellulose dimethyldiallyl ammonium chloride										
	Chlorinated O-[2-hydroxy-3-(trimethylammonio)propyl]hydroxyethyl cellulose										
	Dimethyldiallylammonium chloride/ acrylic acid copolymer (MERQUAT 295)	0.05									
	Hydroxyethyl cellulose						0.1	0.3	0.5	1	1.5
	Resorcin	0.5				0.5	0.5	0.5	0.5	0.5	0.5
	2.6-Diaminopyridine		0.5								
	Meta-aminophenol			0.5							
	5-Aminocresol				0.5						
	Para-aminophenol	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Para-phenylenediamine	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	POE(2) lauryl ether	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	POE(30) cetyl ether	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	POE(50) oleyl ether										
	Stearyltrimethylammonium chloride										
	Lauryltrimethylammonium chloride										
	28% Ammonia	3	3	3	3	3	3	3	3	3	3
	Liquid paraffin										
	Polyethylene glycol 400	4	4	4	4	4	4	4	4	4	4
	1,3-Butylene glycol	3	3	3	3	3	3	3	3	3	3
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5
	Amphoteric polymer/cationic polymer	3	3	3	3	3	3	3	3	3	3
	Amount of polymer	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Viscosity (mPa・s)	500	500	500	500	100	300	700	1,000	1,500	1,900
	Emulsion stability	5	4	4	4	5	5	5	5	5	5
	Viscosity stability	5	5	5	5	5	5	5	5	5	5
	Level dyeability	5	5	5	5	4	5	5	5	4	4

[0199]

[Table 9]

		Example II-21	Example II-22	Example II-23	Example II-24	Example II-25	Example II-26	Example II-27	Example II-28	Example II-29	Example II-30	Example II-31
First agent	Cetanol (16)	1	1	1	1	1	1	1	1	1	1	1
	Hexyldecanol (16)											
	Lauryl alcohol (12)											
	Acrylamide／acrylic acid／dimethyldiallylammonium chloride copolymer (MERQUAT PLUS 3330)	0.02	0.05	0.1	0.17	0.18	0.187	0.19	0.15	0.15	0.15	0.15
	Acrylic acid／methacrylamidepropyltrimethylammonium chloride／methylacrylate copolymer (MERQUAT 2001)											
	Polydimethylmethylenepiperidinum chloride (MERQUAT 100)	0.18	0.15	0.1	0.03	0.02	0.013	0.01	0.05	0.05	0.05	0.05
	Hydroxyethylcellulose dimethyldiallyl ammonium chloride											
	Chlorinated O-[2-hydroxy-3-(trimethylammonio)propyl]hydroxyethyl cellulose											
	Dimethyldiallylammonium chloride/ acrylic acid copolymer (MERQUAT 295)											
	Hydroxyethyl cellulose											
	Resorcin	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.2	0.3	0.7	1
	2,6-Diaminopyridine											
	Meta-aminophenol											
	5-Aminocresol											
	Para-aminophenol	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Para-phenylenediamine	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	POE(2) lauryl ether	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	POE(30) cetyl ether	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	POE(50) oleyl ether											
	Stearyltrimethylammonium chloride											
	Lauryltrimethylammonium chloride											
	28% Ammonia	3	3	3	3	3	3	3	3	3	3	3
	Liquid paraffin											
	Polyethylene glycol 400	4	4	4	4	4	4	4	4	4	4	4
	1,3-Butylene glycol	3	3	3	3	3	3	3	3	3	3	3
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5	95:5
	Amphoteric polymer/cationic polymer	0.11111	0.33333	1	5.66667	9	14.3846	19	3	3	3	3
	Amount of polymer	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	Viscosity (mPa・s)	500	500	500	500	500	500	500	400	500	600	700
	Emulsion stability	5	5	5	5	5	4	4	4	5	5	5
	Viscosity stability	4	5	5	5	5	5	5	5	5	5	4
	Level dyeability	4	5	5	5	5	5	5	5	5	5	4

[0200]

[Table 10]

		Example II-32	Example II-33	Example II-34	Example II-35	Example II-36	Example II-37	Example II-38
First agent	Cetanol (16)	1	1	1	1	1	1	1
	Hexyldecanol (16)							
	Lauryl alcohol (12)							
	Acrylamide／acrylic acid／dimethyldiallylammonium chloride copolymer (MERQUAT PLUS 3330)	0.2	0.2	0.2	0.4	0.2	0.2	0.2
	Acrylic acid／methacrylamidepropyltrimethylammonium chloride／methylacrylate copolymer (MERQUAT 2001)							
	Polydimethylmethylenepiperidinum chloride (MERQUAT 100)	0.1	1	0.02	0.04	0.1	0.1	0.1
	Hydroxyethylcellulose dimethyldiallyl ammonium chloride							
	Chlorinated O-[2-hydroxy-3-(trimethylammonio)propyl]hydroxyethyl cellulose							
	Dimethyldiallylammonium chloride/ acrylic acid copolymer (MERQUAT 295)							
	Hydroxyethyl cellulose							
	Resorcin	0.5	0.5	0.5	0.5	–	0.1	1.2
	2.6-Diaminopyridine							
	Meta-aminophenol							
	5-Aminocresol							
	Para-aminophenol	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Para-phenylenediamine	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	POE(2) lauryl ether	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	POE(30) cetyl ether	1.5	1.5	1.5	1.5	1.5	1.5	1.5
	POE(50) oleyl ether							
	Stearyltrimethylammonium chloride							
	Lauryltrimethylammonium chloride							
	28% Ammonia	3	3	3	3	3	3	3
	Liquid paraffin							
	Polyethylene glycol 400	4	4	4	4	4	4	4
	1,3-Butylene glycol	3	3	3	3	3	3	3
	Purified water	Balance	Balance	Balance	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5	95:5	95:5	95:5
	Amphoteric polymer/cationic polymer	2	0.2	10	10	2	2	2
	Amount of polymer	0.3	1.2	0.22	0.44	0.3	0.3	0.3
	Viscosity (mPa・s)	600	1,000	450	650	300	400	700
	Emulsion stability	5	5	4	5	4	4	5
	Viscosity stability	5	4	5	5	5	5	4
	Level dyeability	5	4	5	5	5	5	4

[0201]

[Table 11]

		Comparative Example II-1	Comparative Example II-2	Comparative Example II-3	Comparative Example II-4
First agent	Cetanol (16)	1	1	1	3
	Hexyldecanol (16)				
	Lauryl alcohol (12)				
	Acrylamide／acrylic acid／dimethyldiallylammonium chloride copolymer (MERQUAT PLUS 3330)		0.2		0.15
	Acrylic acid／methacrylamidepropyltrimethylammonium chloride／methylacrylate copolymer (MERQUAT 2001)				
	Polydimethylmethylenepiperidinum chloride (MERQUAT 100)	0.2			0.05
	Hydroxyethylcellulose dimethyldiallyl ammonium chloride				
	Chlorinated O-[2-hydroxy-3-(trimethylammonio)propyl]hydroxyethyl cellulose				
	Dimethyldiallylammonium chloride/ acrylic acid copolymer (MERQUAT 295)				
	Hydroxyethyl cellulose				
	Resorcin	0.5	0.5	0.5	0.5
	2.6-Diaminopyridine				
	Meta-aminophenol				
	5-Aminocresol				
	Para-aminophenol	0.5	0.5	0.5	0.5
	Para-phenylenediamine	0.5	0.5	0.5	0.5
	POE(2) lauryl ether	1.5	1.5	1.5	1.5
	POE(30) cetyl ether	1.5	1.5	1.5	1.5
	POE(50) oleyl ether				
	Stearyltrimethylammonium chloride				
	Lauryltrimethylammonium chloride				
	28% Ammonia	3	3	3	3
	Liquid paraffin				
	Polyethylene glycol 400	4	4	4	4
	1,3-Butylene glycol	3	3	3	3
	Purified water	Balance	Balance	Balance	Balance
	Stock solution/propellant ratio	95:5	95:5	95:5	95:5
	Amphoteric polymer/cationic polymer	–	–	–	3
	Amount of polymer	0.2	0.2	0	0.2
	Viscosity (mPa・s)	450	450	350	2,500
	Emulsion stability	5	1	1	5
	Viscosity stability	1	5	1	2
	Level dyeability	1	4	1	2

[0202]

[Table 12]

＜Second agent＞

Myristyl alcohol (14)	0.2
Cetanol (16)	0.8
POE(10) cetyl ether	0.5
POE(10) lauryl ether	0.5
35% Hydrogen peroxide solution	5
Hydroxyethanediphosphonic acid	0.1
4Na hydroxyethanediphosphonate	0.2
Phenoxyethanol	0.1
Propylene glycol	0.5
Stearyltrimethylammonium chloride	0.1
Purified water	Balance
Stock solution/propellant ratio	95:5

Industrial Applicability

[0203]

- Regarding Group of First Invention -

There is provided an aerosol-type foamy oxidative hair dye composition which is excellent in level dyeability, hair dyeing power, and operability, and is capable of satisfactorily suppressing dripping.

[0204]

- Regarding IInd Invention Group -

There is provided an aerosol-type foamy oxidative hair dye composition which is excellent in emulsion stability, viscosity stability, and level dyeability, by adding an amphoteric polymer and further blending with a cationic polymer.

CLAIMS

[Claim 1]

An aerosol-type foamy oxidative hair dye composition in which plural agents are mixed after discharging when used, characterized in that:

a mixture of the plural agents contains 0.4 to 1.5% by mass of a higher alcohol which is solid at 25°C under 1 atm., further contains 0.01 to 6% by mass of an ionic surfactant, further contains a C14 or less POE alkyl ether in combination with a C16 or more POE alkyl ether, and a mass ratio of the C16 or more POE alkyl ether to the C14 or less POE alkyl ether is 0.5 to 3,

the mixture of the plural agents has an initial foam specific gravity of 0.03 to 0.18, and

a rate of change in foam specific gravity, which is determined by a foam specific gravity measured 5 minutes after mixing and the initial foam specific gravity, is 100% to 150%.

[Claim 2]

The aerosol-type foamy oxidative hair dye composition according to claim 1, wherein the amount of an oliy component blended in the mixture is 10% by mass or less.

Title of Invention: AEROSOL-TYPE FOAMY OXIDATIVE HAIR DYE COMPOSITION

ABSTRACT

To provide an aerosol-type foamy oxidative hair dye composition which is excellent in level dyeability, hair dyeing power, and operability, and is capable of satisfactorily suppressing dripping. Disclosed is an aerosol-type foamy oxidative hair dye composition in which plural agents are mixed after discharging when used, characterized in that: a mixture of the plural agents contains 0.4 to 1.5% by mass of a higher alcohol which is solid at 25°C under 1 atm., further contains 0.01 to 6% by mass of an ionic surfactant, further contains a C14 or less POE alkyl ether in combination with a C16 or more POE alkyl ether, and a mass ratio of the C16 or more POE alkyl ether to the C14 or less POE alkyl ether is 0.5 to 3, the mixture of the plural agents has an initial foam specific gravity of 0.03 to 0.18, and a rate of change in foam specific gravity, which is determined by a foam specific gravity measured 5 minutes after mixing and the initial foam specific gravity, is 100% to 150%.

[No Figure]