

**COMPOSITION FOR HAIR COSMETIC PREPARATION AND**  
**PRODUCTION METHOD OF THE SAME**

CROSS REFERENCE TO RELATED APPLICATIONS

5 [0001]

The present application claims the priority based on a Japanese Patent Applications No. 2010-257659 filed on November 18, 2010, the disclosures of which are hereby incorporated by reference in its entirety.

10 BACKGROUND

Technical Field

[0002]

The present invention relates to a composition for hair cosmetic preparation or more specifically to a composition for hair cosmetic preparation including a plurality of different agents, which are composed to self-foam and provide foam hair cosmetic preparation when being mixed with each other, as well as to a production method of such a composition for hair cosmetic preparation.

20 Related Art

[0003]

Liquid or cream hair cosmetic preparations have conventionally been used for hair bleaching or hair dyeing. The recent trend is foam hair cosmetic preparations, which are more easily applicable on the hair and have less unevenness in application, compared with the liquid or cream hair cosmetic preparations. The foam hair cosmetic preparations include aerosol-type hair cosmetic preparation (for example, JPH10-287534A) and non-aerosol-type hair cosmetic preparation (for example, JP 2004-339216A).

[0004]

30 The aerosol-type hair cosmetic preparation uses a special pressure container and aerosol propellant to prepare hair cosmetic foam. The aerosol-type hair cosmetic preparation has potential for corrosion and the

increased internal pressure of the pressure container and requires the time-consuming action for disposal after the use. The non-aerosol-type hair cosmetic preparation includes a plurality of agents mixed with each other to have relatively low viscosity for easily preparing hair cosmetic foam. The non-aerosol-type hair cosmetic preparation accordingly has the problem of dripping in use.

## SUMMARY

[0005]

By taking into account at least part of the issue discussed above, there is a requirement for providing a composition for hair cosmetic preparation composed to readily provide non-aerosol-type foam hair cosmetic preparation having adequate viscosity to prevent dripping in use.

[0006]

According to one aspect of the present invention, a composition for hair cosmetic preparation to provide foam hair cosmetic preparation is provided. The composition for hair cosmetic preparation comprises: a plurality of different agents including a first agent and a second agent, wherein the first agent containing at least a carbonate, wherein the second agent containing at least an acid having function of decomposing the total carbonate, wherein the plurality of different agents are composed to self-foam when being mixed with each other, and at least one agent among the plurality of different agents contains a thickener to regulate viscosity of the hair cosmetic preparation in a range of 1,500 mPa·s to 83,000 mPa·s.

[0007]

In the composition for hair cosmetic preparation according to this aspect of the invention, at least one agent among the plurality of different agents contains a thickener to regulate the viscosity of the hair cosmetic preparation in the range of 1,500 mPa·s to 83,000 mPa·s. Using the thickener in this manner prevents destruction of the foam of carbon dioxide produced by mixing the plurality of different agents with each other and assures good foam retention of the resulting hair cosmetic preparation. The composition for hair

cosmetic preparation of the invention readily provides the non-aerosol-type foam hair cosmetic preparation having the adequate viscosity for preventing the foam hair cosmetic preparation from dripping off in use (during application and during exposure).

5 [0008]

In one preferable aspect of the present invention, the thickener is an associative thickener.

[0009]

In the composition for hair cosmetic preparation of this aspect, at least one agent among the plurality of different agents contains an associative thickener. Using the associative thickener enables production of the composition for hair cosmetic preparation without increasing the viscosity of each of the plurality of different agents. The composition for hair cosmetic preparation of this aspect readily provides the hair cosmetic preparation thickened in the adequate pH range by mixing the plurality of different agents with each other.

[0010]

In one preferable aspect of the present invention, the carbonate includes at least one carbonate selected among the group consisting of alkali metal carbonates, alkaline earth carbonates, alkali metal bicarbonates, alkaline earth bicarbonates, ammonium carbonate, and ammonium hydrogen carbonate.

[0011]

In the composition for hair cosmetic preparation of this aspect, the first agent contains at least one carbonate selected among the group consisting of alkali metal carbonates, alkaline earth carbonates, alkali metal bicarbonates, alkaline earth bicarbonates, ammonium carbonate, and ammonium hydrogen carbonate. The first agent accordingly has the good solubility in water and the good reactivity with the acid. The composition for hair cosmetic preparation of this aspect has the improved foam formation during mixing of the plurality of different agents with each other.

[0012]

In one preferable aspect of the present invention, content of the carbonate in the hair cosmetic preparation is in a range of 1.0% by weight to 30.0% by weight.

[0013]

5           In the composition for hair cosmetic preparation of this aspect, the content of one or more carbonates in the resulting hair cosmetic preparation is 1.0% by weight to 30.0% by weight. The composition for hair cosmetic preparation of this aspect enables self-foam formation during mixing of the plurality of different agents with each other.

10   [0014]

In one preferable aspect of the present invention, the hair cosmetic preparation is used for hair dyeing and has pH in a range of 1.0 to 9.0.

[0015]

15           In the composition for hair cosmetic preparation of this aspect, the resulting hair cosmetic preparation used for hair dyeing has pH in the range of 1.0 to 9.0, thus exerting the high hair dyeing power and assuring the adequate viscosity. The composition for hair cosmetic preparation of this aspect enables the efficient reaction of the carbonate with the acid and thereby provides fine foam hair cosmetic preparation.

20   [0016]

In one preferable aspect of the present invention, the hair cosmetic preparation is used for either hair dyeing or hair bleaching and has pH in a range of 6.0 to 9.0.

[0017]

25           In the composition for hair cosmetic preparation of this aspect, the resulting hair cosmetic preparation used for hair dyeing or hair bleaching has pH in the range of 6.0 to 9.0, thus exerting the high hair dyeing or hair bleaching power and assuring the adequate viscosity. The composition for hair cosmetic preparation of this aspect enables the efficient reaction of the  
30   carbonate with the acid and thereby provides fine foam hair cosmetic preparation.

[0018]

In one preferable aspect of the present invention, at least one agent among the plurality of different agents contains a higher alcohol having either a linear alkyl group of 10 to 30 carbon atoms or an alkenyl group of 10 to 30 carbon atoms.

5 [0019]

In the composition for hair cosmetic preparation of this aspect, at least one agent among the plurality of different agents contains a higher alcohol having either a linear alkyl group of 10 to 30 carbon atoms or an alkenyl group of 10 to 30 carbon atoms. The higher alcohol provides the resulting hair  
10 cosmetic preparation with adequate hardness and prevents destruction of the foam of carbon dioxide produced by mixing the plurality of different agents with each other, thus assuring good foam retention. The higher alcohol also provides fine foam hair cosmetic preparation.

[0020]

15 According to one aspect of the present invention, a production method of a first agent containing at least a carbonate, wherein the first agent is included in a composition for hair cosmetic preparation as one of a plurality of different agents, which are composed to self-foam and provide foam hair cosmetic preparation when being mixed with each other is provided. The  
20 production method of a first agent comprises: a first step of mixing a non-acidic base component with a reducing agent component to prepare an emulsion mixture; a second step of adding an alkaline agent component containing the carbonate to the emulsion mixture of the first step; and a third step of adding an acidic base component to the emulsion mixture of the second step.

25 [0021]

The production method of the first agent containing at least the carbonate in the composition for hair cosmetic preparation according to this aspect of the invention adds the alkaline agent component containing the carbonate to the emulsion mixture prepared by mixing the non-acidic base  
30 component with the reducing agent component and subsequently adds the acidic base component to the emulsion mixture. This method enables the alkaline agent component, i.e., the carbonate, to be added to the emulsion

mixture kept in the alkaline condition. This prevents foam formation by exposure of the carbonate to the acidic emulsion mixture in the production method of the first agent. The production method of the first agent of the invention produces the composition for hair cosmetic preparation, which readily provides the non-aerosol-type foam hair cosmetic preparation having the adequate viscosity for preventing the foam hair cosmetic preparation from dripping off in use (during application and during exposure).

[0022]

The technique of the present invention is not restricted to the composition for hair cosmetic preparation or the production method of the first agent having any of the configurations and arrangements discussed above but may be actualized by diversity of other applications, for example, a production method of the composition for hair cosmetic preparation, a hair cosmetic preparation produced from the composition for hair cosmetic preparation, and a production method of a hair cosmetic preparation from the composition for hair cosmetic preparation.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0023]

Fig. 1 is an explanatory diagrammatic representation of a hair cosmetic kit 10 in one embodiment of the present invention;

Fig. 2 is a flowchart of a hair cosmetic preparing process using the hair cosmetic kit 10;

Figs. 3 is an explanatory diagrammatic representations of the hair cosmetic preparing process using the hair cosmetic kit 10;

Figs. 4 is an explanatory diagrammatic representations of the hair cosmetic preparing process using the hair cosmetic kit 10;

Fig. 5 is a flowchart of a production process of the first agent 300 in the composition for hair cosmetic preparation;

Fig. 6 is a flowchart of a production process of the second agent 400 in the composition for hair cosmetic preparation;

Fig. 7 is a table of different samples of the first agent 300 subjected to

an experiment on the viscosity of hair cosmetic preparation;

Fig. 8 is a table of different samples of the second agent 400 subjected to the experiment on the viscosity of hair cosmetic preparation;

5 Fig. 9 is a table of the results of the experiment on the viscosity of hair cosmetic preparation;

Fig. 10 is a table of different samples of the first agent 300 subjected to an experiment on the different thickeners;

Fig. 11 is a table of different samples of the second agent 400 subjected to the experiment on the different thickeners;

10 Fig. 12 is a table of the results of the experiment on the different thickeners;

Fig. 13 is a table of different samples of the first agent 300 subjected to another experiment on the different thickeners;

15 Fig. 14 is a table of different samples of the second agent 400 subjected to another experiment on the different thickeners;

Fig. 15 is a table of the results of another experiment on the different thickeners;

Fig. 16 is a table of different samples of the first agent 300 subjected to an experiment on the different carbonates;

20 Fig. 17 is a table of different samples of the second agent 400 subjected to the experiment on the different carbonates;

Fig. 18 is a table of the results of the experiment on the different carbonates;

25 Fig. 19 is a table of different samples of the first agent 300 subjected to an experiment on the pH of the hair cosmetic preparation for hair dyeing to the brighter hair color or hair bleaching;

Fig. 20 is a table of different samples of the second agent 400 subjected to the experiment on the pH of the hair cosmetic preparation for hair dyeing to the brighter hair color or hair bleaching;

30 Fig. 21 is a table of the results of the experiment on the pH of the hair cosmetic preparation for hair dyeing to the brighter hair color or hair bleaching;

Fig. 22 is a table of the results of the experiment on the content of the carbonate contained in the hair cosmetic preparation for hair dyeing to the brighter hair color or hair bleaching;

5 Fig. 23 is a table of different samples of the first agent 300 subjected to an experiment on the pH of the hair cosmetic preparation for hair dyeing to the darker hair color;

Fig. 24 is a table of different samples of the second agent 400 subjected to the experiment on the pH of the hair cosmetic preparation for hair dyeing to the darker hair color;

10 Fig. 25 is a table of the results of the experiment on the pH of the hair cosmetic preparation for hair dyeing to the darker hair color;

Fig. 26 is a table of the results of the experiment on the content of the carbonate contained in the hair cosmetic preparation for hair dyeing to the darker hair color;

15 Fig. 27 is a table of different samples of the first agent 300 subjected to an experiment on the different higher alcohols;

Fig. 28 is a table of different samples of the second agent 400 subjected to the experiment on the different higher alcohols; and

20 Fig. 29 is a table of the results of the experiment on the different higher alcohols.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0024]

Some modes of carrying out the invention are discussed below.

25

### A. Embodiment

#### A-1. Hair Cosmetic Kit

[0025]

30 Fig. 1 is an explanatory diagrammatic representation of a hair cosmetic kit 10 in one embodiment of the present invention. The hair cosmetic kit 10 includes a mixing vessel 100, a mixing tool 200, a first agent 300, and a second agent 400. In the description hereafter, the first agent 300

and the second agent 400 are collectively referred to as "composition for hair cosmetic preparation".

[0026]

The first agent 300 and the second agent 400 are liquid or cream  
5 agents separately contained in respective containers (e.g., tube containers).  
The compositions of the first agent 300 and the second agent 400 are  
determined such as to generate hair cosmetic foam (hair dye or decolorant)  
when being mixed with each other. The first agent 300 contains a carbonate  
(e.g., sodium hydrogen carbonate) as its component, while the second agent  
10 400 contains an acid for decomposing the carbonate as its component. Mixing  
the first agent 300 with the second agent 400 causes the carbonate contained  
in the first agent 300 to react with the acid contained in the second agent 400  
and effervesces (i.e. produces bubbles of carbon dioxide).The respective  
components of the first agent 300 and the second agent 400 will hereinafter be  
15 described in detail.

[0027]

The mixing vessel 100 is a cup-like container for holding the first agent  
300 and the second agent 400 to be mixed with each other and is made of a  
resin (e.g., polypropylene or PP). The mixing tool 200 is a plate-like or more  
20 specifically spatulate tool used to mix the first agent 300 and the second agent  
400 held in the mixing vessel 100 and is made of a resin (e.g., PP).

## A-2. Hair Cosmetic Preparing Process

[0028]

25 Fig. 2 is a flowchart of a hair cosmetic preparing process using the hair  
cosmetic kit 10. Figs. 3 and 4 are explanatory diagrammatic representations  
of the hair cosmetic preparing process using the hair cosmetic kit 10.

[0029]

The process first provides the hair cosmetic kit 10 including the mixing  
30 vessel 100, the mixing tool 200, the first agent 300, and the second agent 400  
as shown in Fig. 1(step S110) and places the first agent 300 and the second  
agent 400 from the respective containers into the mixing vessel 100 (step

S120). Fig. 3 shows the operation of placing the first agent 300 and the second agent 400 from the respective containers into the mixing vessel 100.

[0030]

The process subsequently mixes the first agent 300 and the second agent 400 with each other in the mixing vessel 100 using the mixing tool 200 (step S130). Fig. 3 also shows the operation of mixing the first agent 300 with the second agent 400 using the mixing tool 200. Mixing the first agent 300 and the second agent 400 with each other using the mixing tool 200 causes the carbonate contained in the first agent 300 to react with the acid contained in the second agent 400 and effervesces (i.e. produces bubbles of carbon dioxide). This series of operations eventually prepare hair cosmetic foam in the mixing vessel 100. Fig. 4 shows the hair cosmetic foam FO thus prepared in the mixing vessel 100. As shown in Fig. 4, the mixing tool 200 is also used as a tool of scooping up the hair cosmetic foam FO from the mixing vessel 100. The user manipulates the mixing tool 200 to scoop up the hair cosmetic foam FO, takes up the hair cosmetic foam FO from the mixing tool 200 onto the hand, and applies the hair cosmetic foam FO on the hair.

[0031]

As described above, the hair cosmetic preparing process using the hair cosmetic kit 10 of the embodiment readily prepares hair cosmetic foam without requiring any special container or any special aerosol propellant by simply mixing the plurality of different agents with each other, which are composed to self-foam and provide the hair cosmetic foam when being mixed. The user is not required to perform any specialized operation, such as shaking agents contained in the containers, but is simply required to stir the first agent 300 and the second agent 400 contained in the mixing vessel 100 with the mixing tool 200. The hair cosmetic preparing process using the hair cosmetic kit 10 of the embodiment enables the user to view the process of mixing the plurality of different liquid or cream agents to gradually effervesce and generate the hair cosmetic foam FO. This has the visual effect to raise expectations of the user (e.g., fun and excitement).

### A-3. Production Method of Composition for Hair Cosmetic Preparation

[0032]

Fig. 5 is a flowchart of a production process of the first agent 300 in the composition for hair cosmetic preparation. The process first selects an alkaline agent (A), a non-acidic base (B), an acidic base (C), and a reducing agent (D) as material components of the first agent 300 (step S210).

[0033]

One or more carbonates are employed as the alkaline agent (A). Specifically, the alkaline agent (A) may be one or more carbonates selected among, for example, alkali metal carbonates, alkaline earth carbonates, alkali metal bicarbonates, alkaline earth bicarbonates, ammonium carbonate, and ammonium hydrogen carbonate. The total content of the carbonates in the resulting hair cosmetic preparation (i.e., agent mixture of the first agent 300 and the second agent 400) is preferably in a range of 1.0 to 30.0% by weight or more preferably in a range of 1.5 to 20.0% by weight. Ammonia water may be used in addition to the carbonates, as appropriate.

[0034]

The non-acidic base (B) is not specifically restricted but may be any non-acidic chemical. One single chemical or a combination of two or more chemicals may be employed as the non-acidic base (B), depending on the application and the formulation of the resulting hair cosmetic preparation (e.g., hair dye or hair bleach). Typical examples available as the non-acidic base (B) include oxidative dyes, hydrocarbons, esters, silicones, higher alcohols, animal and vegetable oils and fats, surface active agents, plant extracts, alcohols, natural and synthetic polymers, aroma chemicals, and purified water. It is desirable to employ one or more higher alcohols (for example, cetyl alcohol or stearyl alcohol) having either a linear alkyl group of 10 to 30 (preferably 12 to 24 or more preferably 14 to 22) carbon atoms or an alkenyl group of 10 to 30 (preferably 12 to 24 or more preferably 14 to 22) carbon atoms.

[0035]

The acidic base (C) is not specifically restricted but may be any acidic chemical. One single chemical or a combination of two or more chemicals

may be employed as the acidic base (C), depending on the application and the formulation of the resulting hair cosmetic preparation. In the composition for hair cosmetic preparation of the embodiment, the first agent 300 includes a thickener agent. The acidic base (C) may thus be one or more chemicals  
5 selected among, for example, organic acids such as L-ascorbic acid, citric acid, and glycolic acid, inorganic acids such as phosphoric acid and sulfuric acid, and carboxy vinyl polymer as the thickener. Any of different thickening agents may be employed as the thickener of the embodiment. Especially preferable are associative thickeners (neutralized thickeners) that are thickened in a  
10 specific pH range. The content of the thickener in the resulting hair cosmetic preparation (i.e., agent mixture) should be set such that the resulting hair cosmetic preparation provides the viscosity preferably in a range of 1,500 mPa·s to 83,000 mPa·s or more preferably in a range of 1,500 mPa·s to 30,000 mPa·s.

15 [0036]

The reducing agent (D) may be one or more chemicals selected among, for example, cysteine and its derivatives, mercapto-carboxylic acids such as thiomalic acid, mercapto-alcohols such as thioglycerol, mercapto-carboxylates such as glycerol monothioglycolate, mercapto-compounds such as cysteamine  
20 and cysteine amide, sulfites such as sulfurous acid and sodium sulfite, hydrogen sulfites such as sodium hydrogen sulfite, ascorbic acid and its derivatives.

[0037]

The process subsequently classifies and weighs the material  
25 components selected as the non-acidic base (B) and the reducing agent (D) at step S210 into different property groups, i.e., an oil-phase group of oil-soluble components, a water-phase group of water-soluble components, and an additive group of additive components that are rather unstable in a high temperature condition. The process also weighs the material components  
30 selected as the alkaline agent (A) and the acidic base (C) separately (step S212). The process then separately heats and fuses the weighed material components of the oil-phase group and the weighed material components of the

water-phase group (step S214). The process performs temperature regulation of the fused oil-phase group and of the fused water-phase group to respectively specified temperatures, and adds the water-phase group into the oil-phase group and then mixes to provide an emulsion mixture (step S216). The  
5 objective temperatures of the temperature regulation are determined as appropriate by taking into account the properties of the respective material components. Such temperature regulation is similarly performed in later steps.

[0038]

10 The process performs further temperature regulation of the resulting emulsion mixture provided at step S216 to a preset temperature and adds the additive group of additive components to the emulsion mixture (step S218). After further temperature regulation of the emulsion mixture provided at step S218 to a preset temperature, the process adds the weighed material  
15 components of the alkaline agent (A) (step S220). It is desirable to add the material components of the alkaline agent (A) in a low temperature condition. At this step, the resulting emulsion mixture is kept alkaline. After further temperature regulation of the alkaline emulsion mixture provided at step S220 to a preset temperature, the process adds the weighed material components of  
20 the acidic base (C) (step S222). It is desirable to add the material components of the acidic base (C) in a low temperature condition. The process then places the resulting emulsion mixture provided at step S222 into a specific container (step S224). In the description hereof, steps S216, S220, and S222 are also referred to as a first step, a second step, and a third step, respectively.

25 [0039]

As discussed above, the production process of the first agent 300 adds the material components of the alkaline agent (A) to the emulsion mixture before adding the material components of the acidic base (C). Adding the  
30 respective material components to the emulsion mixture in this sequence enables the alkaline agent (A), i.e., one or more carbonates, to be added to the emulsion mixture kept in the alkaline state and thereby prevents the carbonate(s) from being exposed to the acidic state and thus forming.

[0040]

Fig. 6 is a flowchart of a production process of the second agent 400 in the composition for hair cosmetic preparation. The process first selects a base (E), a pH regulator (F), an oxidizing agent (G) as material components of the second agent 400 (step S310).

[0041]

The base (E) is not specifically restricted but may be any adequate chemical. One single chemical or a combination of two or more chemicals may be employed as the component of the base (E), depending on the application and the formulation of the resulting hair cosmetic preparation. Typical examples available as the component of the base (E) include hydrocarbons, esters, silicones, higher alcohols, animal and vegetable oils and fats, surface active agents, plant extracts, alcohols, natural and synthetic polymers, aroma chemicals, and purified water.

[0042]

One or more acids having the function of decomposing the carbonates contained in the first agent 300 are employed as the pH regulator (F). The component of the pH regulator (F) may be one or more acids selected among, for example, organic acids such as citric acid and glycolic acid and inorganic acids such as phosphoric acid and sulfuric acid. In the application of the hair cosmetic preparation for dyeing the hair to the darker color, the content of the pH regulator is set such that the resulting hair cosmetic preparation (i.e., agent mixture) provides the pH preferably in a range of 1.0 to 9.0 or more preferably in a range of 3.0 to 7.0. In the application of the hair cosmetic preparation for dyeing the hair to the brighter color or bleaching the hair, on the other hand, the content of the pH regulator is set such that the resulting hair cosmetic preparation (i.e., agent mixture) provides the pH preferably in a range of 6.0 to 9.0 or more preferably in a range of 7.0 to 8.5. The “hair bleaching” refers to decolorization of melanin pigment in the hair. The “hair dyeing” refers to changing the tone and the brightness of the hair color through oxidation of the oxidative dye. The “hair dyeing” may change the tone and the brightness of the hair color through oxidation of the oxidative dye

accompanied with the hair bleaching.

[0043]

The oxidizing agent (G) may be one or more chemical selected among, for example, hydrogen peroxide and oxygen-generating or hydrogen peroxide-generating agents such as urea peroxide, melamine peroxide, sodium perborate, potassium perborate, and potassium percarbonate.

[0044]

The process subsequently classifies and weighs the material components selected as the base (E), the pH regulator (F), and the oxidizing agent (G) at step S310 into different property groups, i.e., an oil-phase group of oil-soluble components, a water-phase group of water-soluble components, and an additive group of additive components that are rather unstable in a high temperature condition (step S312). The process then separately heats and fuses the weighed material components of the oil-phase group and the weighed material components of the water-phase group (step S314). The process performs temperature regulation of the fused oil-phase group and of the fused water-phase group to respectively specified temperatures, and adds the water-phase group into the oil-phase group and then mixes to provide an emulsion mixture (step S316). The process performs further temperature regulation of the resulting emulsion mixture provided at step S316 to a preset temperature and adds the additive group of additive components to the emulsion mixture (step S318). The process then places the resulting emulsion mixture provided at step S318 into a specific container (step S324).

## B. Results of Experiments

[0045]

Various experiments were performed to evaluate different examples of the hair cosmetic preparation component of the embodiment discussed above by varying the components and their contents in the hair cosmetic preparation component. The results of the experiments are discussed below.

[0046]

Unless otherwise specified, the procedure of the following experiments

mixed each of different samples of the first agent 300 produced according to the production process discussed above with reference to Fig. 5 with each of different samples of the second agent 400 produced according to the production process discussed above with reference to Fig. 6 at a mixing ratio (weight ratio) of 1 to 1 in the mixing vessel 100 of 550 ml capacity (Fig. 1) with the mixing tool 200 (Fig. 1) and evaluated each of the resulting hair cosmetic preparations (agent mixtures). The two agents 300 and 400 were mixed with each other according to the hair cosmetic preparing method discussed above with reference to Fig. 2.

#### B-1. Results of Experiment 1 (Experiment on Viscosity of Hair Cosmetic Preparation)

[0047]

Fig. 7 is a table of different samples of the first agent 300 subjected to an experiment on the viscosity of hair cosmetic preparation. Fig. 8 is a table of different samples of the second agent 400 subjected to the experiment on the viscosity of hair cosmetic preparation. Fig. 9 is a table of the results of the experiment on the viscosity of hair cosmetic preparation. For the simplicity of illustration, the first agent and the second agent are respectively represented as "agent 1" and "agent 2" in these tables. Unless otherwise specified, in this experiment and any other experiments, one identical sample number is allocated to a corresponding set of the first agent, the second agent, and the evaluation result. For example, the evaluation result of a sample #10 shown in Fig. 9 refers to the result of the experiment on the hair cosmetic preparation provided by mixing a first agent of the sample #10 shown in Fig. 7 with a second agent of the sample #10 shown in Fig. 8.

[0048]

The experiment provided a plurality of samples (#10 through #19) by changing the contents of carbonates (potassium carbonate and ammonium hydrogen carbonate) and the content of a thickener (carboxy vinyl polymer) contained in the first agent to vary the viscosity of resulting hair cosmetic preparations (agent mixtures). The samples #10 through #19 were evaluated

for the following performances: (1-1) foam retention, (1-2) dripping during application, (1-3) dripping during exposure, and (1-4) affinity to the hair. The viscosity of each of the hair cosmetic preparations or agent mixtures was measured at 20°C after the agent mixture was defoamed or degassed in vacuum condition and was rotated at 6 rpm for 1 minute with rotor No. 4 of a B-type rotary viscometer. The evaluation procedures and the evaluation criteria are given below.

[0049]

(1-1) Foam retention of each of the agent mixtures was visually checked and evaluated during mixing of the first agent with the second agent. The state that "foam starts disappearing" means the decreasing tendency of foam formed by the reaction of the carbonate with the acid. The number of stirs was counted, where "one stir" refers to one circular motion along the inner circumference of the mixing vessel 100 (Fig. 1) with the mixing tool 200 (Fig. 1).

#### Evaluation Criteria for Foam Retention

- A. Foam was retained even after 100 or more stirs;
- B. Foam was retained after 50 stirs;
- C. Foam started disappearing before 50 stirs; and
- D. No foam formation was observed or foam immediately started disappearing after stirring.

[0050]

(1-2) Dripping during application of each of the agent mixtures was evaluated by twenty voluntary subjects during application of 150 grams of the agent mixture foam (hair cosmetic foam) over the entire hair at 25°C.

#### Evaluation Criteria for Dripping during Application

- A. No dripping was observed during application on the hair;
- B. Substantially no dripping was observed during application on the hair;
- C. Slight dripping was observed during application on the hair; and
- D. Considerable dripping was observed during application on the hair.

[0051]

(1-3) Dripping during exposure of each of the agent mixtures was evaluated by leaving 150 grams of the agent mixture foam applied over the entire hair of a hair dye test doll at 35°C.

Evaluation Criteria for Dripping during Exposure

- 5           A. No dripping was observed over the entire exposure time;  
            B. No dripping was observed within 30-minutes exposure;  
            C. Slight dripping was observed within 30-minutes exposure; and  
            D. Considerable dripping was observed within 30-minutes exposure.

[0052]

- 10           (1-4) Affinity of each of the agent mixtures to the hair was evaluated by twenty voluntary subjects during application of the agent mixture foam (hair cosmetic foam) over the entire hair of a hair dye test doll at 25°C. In the description hereof, the "affinity to the hair" refers to the permeability of the agent mixture into the hair.

15   Evaluation Criteria for Affinity to the Hair

- A. Excellent affinity to the hair;  
            B. Good affinity to the hair;  
            C. Poor affinity to the hair; and  
            D. No affinity to the hair.

20   [0053]

- According to the results of this evaluation test, the agent mixtures of the samples #10 through #13 having the viscosity in the range of 1,500 mPa·s to 30,000 mPa·s had A levels for all the evaluation points. Each of the samples #10 through #13 had the foam retained even after 100 or more stirs  
25   (excellent foam retention), no dripping during application and during exposure, and excellent affinity to the hair. The agent mixture of the sample #15 having the viscosity of 75,400 mPa·s and the agent mixture of the sample #18 having the viscosity of 82,600 mPa·s had the foam started disappearing before 50 stirs and poor affinity to the hair, but no dripping during application and  
30   during exposure.

[0054]

            The agent mixture of the sample #14 having the viscosity of 750 mPa·s

and the agent mixture of the sample #17 having the viscosity of 1,200 mPa·s had the foam started disappearing before 50 stirs and considerable dripping during application and during exposure. The agent mixtures of the samples #16 and #19 having the viscosity of or over 100,000 mPa·s had no foam formation and no affinity to the hair (i.e., poor permeability into the hair and poor usability).

[0055]

These results of the evaluation test show that it is preferable to set the content of the thickener contained in the resulting hair cosmetic preparation (agent mixture) such that the resulting hair cosmetic preparation has the viscosity in the range of 1,500 mPa·s to 83,000 mPa·s. Regulating the viscosity of the hair cosmetic preparation to this adequate range prevents destruction of the foam of carbon dioxide produced by mixing the first agent with the second agent (i.e., mixing the carbonate with the acid). Such regulation thus readily provides the non-aerosol-type hair cosmetic foam having the adequate viscosity for preventing the hair cosmetic foam from dripping off during application and during exposure.

[0056]

These results of the evaluation test show that it is especially preferable to set the content of the thickener contained in the resulting hair cosmetic preparation (agent mixture) such that the resulting hair cosmetic preparation has the viscosity in a range of 1500 mPa·s to 30,000 mPa·s. Regulating the viscosity to this preferable range provides the hair cosmetic preparation having the excellent foam retention, the excellent permeability during application, and the good usability.

## B-2. Results of Experiment 2 (Experiment on Different Thickeners)

[0057]

Fig. 10 is a table of different samples of the first agent 300 subjected to an experiment on the different thickeners. Fig. 11 is a table of different samples of the second agent 400 subjected to the experiment on the different thickeners. Fig. 12 is a table of the results of the experiment on the different

thickeners.

[0058]

The experiment provided a plurality of samples (#20 through #24) by changing the thickener (carboxy vinyl polymer, acrylic acid-alkyl methacrylate copolymer, sodium carboxymethylcellulose, and xanthane gum) contained in the first agent and its content. The viscosity of each of the hair cosmetic preparations or agent mixtures of the samples #20 through #24 was measured. The samples #20 through #24 were evaluated for the following performances: (2-1) foam retention; and (2-2) dispersibility of thickener in preparation of the first agent. The viscosity of each of the agent mixtures was measured in the same manner as described above in "B-1. Results of Experiment 1".

[0059]

(2-1) Foam retention of each of the agent mixtures of the samples #20 through #24 was evaluated according to the evaluation method and the evaluation criteria described above in "B-1. Results of Experiment 1, (1-1)".

[0060]

(2-2) Dispersibility of each of the thickeners in preparation of the first agent was evaluated by visually checking whether the thickener is readily dispersed in the first agent when the thickener is added to and mixed with the other components of the first agent.

Evaluation Criteria for Dispersibility of Thickener in preparation of First Agent

A. Thickener was readily dispersed in preparation of the first agent;

B. Thickener was dispersible in preparation of the first agent;

C. Thickener was dispersible to some extent with clumps in preparation of the first agent; and

D. Thickener was not dispersible in preparation of the first agent.

[0061]

According to the results of this evaluation test, the agent mixtures of all the samples #20 through #24 had A level (i.e., foam was retained even after 100 or more stirs) for (2-1) foam retention. In the samples #20 through #22 containing any of associative thickeners, the thickeners were readily dispersed

in preparation of the first agent. In the sample #23 containing a non-associative thickener, the thickener was dispersed to some extent with clumps in preparation of the first agent. In the sample #24 containing another non-associative thickener, the thickener was not dispersed in overall preparation of the first agent.

[0062]

These results of the evaluation test show that it is preferable to add the associative thickener (i.e., thickener exerting the thickening effect only in a specific pH range) to the composition for hair cosmetic preparation. The associative thickener assures the good dispersibility in preparation of the first agent.

### B-3. Results of Experiment 3 (Another Experiment on Different Thickeners)

[0063]

Fig. 13 is a table of different samples of the first agent 300 subjected to another experiment on the different thickeners. Fig. 14 is a table of different samples of the second agent 400 subjected to another experiment on the different thickeners. Fig. 15 is a table of the results of another experiment on the different thickeners.

[0064]

The experiment provided a plurality of samples (#30 through #33) by changing the content of potassium hydroxide contained in the first agent and the content of phosphoric acid contained in the second agent to vary the pH of the first agent and the pH of the second agent and by adding the thickener (carboxy vinyl polymer or sodium carboxymethylcellulose) to either the first agent or the second agent. The viscosity of each of the first agents, the viscosity of each of the second agents, and the viscosity and the pH of each of the hair cosmetic preparations or agent mixtures were measured for the samples #30 through #33. The samples #30 through #33 were evaluated for the following performances: (3-1) foam retention; and (3-2) dispersibility of thickener in preparation of either the first agent or the second agent. The viscosity of each of the agent mixtures was measured in the same manner as

described above in "B-1. Results of Experiment 1". The viscosity of each of the first agents and the viscosity of each of the second agents were measured at 20°C after the agent was rotated at 6 rpm for 1 minute with rotor No. 4 of a B-type rotary viscometer.

5 [0065]

(3-1) Foam retention of each of the agent mixtures of the samples #30 through #33 was evaluated according to the evaluation method and the evaluation criteria described above in "B-1. Results of Experiment 1, (1-1)".

[0066]

10 (3-2) Dispersibility of each of the thickeners in preparation of either the first agent or the second agent was evaluated according to the evaluation method and the evaluation criteria described above in "B-2. Results of Experiment 2, (2-2)".

[0067]

15 The samples #30 and #32 were prepared to have the same content of potassium hydroxide in the first agent. The sample #30 containing the associative thickener (carboxy vinyl polymer) had the lower viscosity of the first agent and the less content of the thickener, compared with the sample #32 containing the non-associative thickener (sodium carboxymethylcellulose).

20 The samples #31 and #33 were prepared to have the same content of phosphoric acid in the second agent. The sample #31 containing the associative thickener (carboxy vinyl polymer) had the lower viscosity of the second agent and the less content of the thickener, compared with the sample #33 containing the non-associative thickener (sodium carboxymethylcellulose).

25 [0068]

In the samples #30 and #31 containing the associative thickener (carboxy vinyl polymer), the thickener was readily dispersed in preparation of the first agent or in preparation of the second agent. In the samples #32 and #33 containing the non-associative thickener (sodium carboxymethylcellulose),  
30 on the other hand, the thickener was not dispersed in preparation of the first agent or in preparation of the second agent.

[0069]

The results of this evaluation test also show that it is preferable to add the associative thickener (i.e., thickener exerting the thickening effect only in a specific pH range) to the composition for hair cosmetic preparation or the agent mixture. Using the associative thickener provides the composition for hair cosmetic preparation with the reduced content of the thickener in the agent and the lowered viscosities of both the agent containing the thickener and the other agent. The neutralization of the carbonate with the acid in the process of mixing the plurality of different agents, i.e., the first agent and the second agent, with each other enables the resulting hair cosmetic preparation or agent mixture to have the adequate pH range for exerting the thickening effect. The associative thickener also assures the good dispersibility in preparation of the first agent or in preparation of the second agent. The results of this evaluation test show that the associative thickener may be added to either of the first agent and the second agent.

#### B-4. Results of Experiment 4 (Experiment on Different Carbonates)

[0070]

Fig. 16 is a table of different samples of the first agent 300 subjected to an experiment on the different carbonates. Fig. 17 is a table of different samples of the second agent 400 subjected to the experiment on the different carbonates. Fig. 18 is a table of the results of the experiment on the different carbonates.

[0071]

The experiment provided a plurality of samples (#40 through #50) by changing the carbonate (potassium carbonate, ammonium hydrogen carbonate, sodium carbonate, sodium hydrogen carbonate, potassium hydrogen carbonate, calcium carbonate, barium carbonate, propylene carbonate, and ethylene carbonate) contained in the first agent and its content. The samples #40 through #50 were evaluated for the following performance: (4-1) foam formation during mixing, and the carbonates contained in the samples #40 through #50 were evaluated respectively for the following performance: (4-2) solubility of carbonate.

[0072]

(4-1) In each of the samples #40 through #50, foam formation during mixing of the first agent with the second agent was visually checked and evaluated.

5    Evaluation Criteria for Foam Formation

- A. Excellent foam formation;
- B. Good foam formation;
- C. Poor foam formation; and
- D. Substantially no foam formation.

10   [0073]

(4-2) Solubility of the carbonate was visually checked and evaluated by adding the carbonate into water with stirring.

Evaluation Criteria for Solubility of Carbonate

- A. Excellent solubility in water;
- 15    B. Good solubility in water;
- C. Poor solubility in water; and
- D. Substantially no solubility in water.

[0074]

20    According to the results of this evaluation test, the samples #40 and #43 containing ammonium hydrogen carbonate, the sample #41 containing potassium carbonate and ammonium hydrogen carbonate, the sample #42 containing potassium carbonate, the sample #44 containing sodium carbonate, the sample #45 containing sodium hydrogen carbonate, the sample #46 containing potassium hydrogen carbonate, the sample #47 containing calcium carbonate, and the sample #48 containing barium carbonate as the carbonate had the excellent foam formation during mixing of the first agent with the second agent. The sample #49 containing propylene carbonate and the sample #50 containing ethylene carbonate as the carbonate, however, had substantially no foam formation during mixing of the first agent with the second agent.

30

[0075]

The carbonates contained in the samples #40 through #46 (potassium

carbonate, ammonium hydrogen carbonate, sodium carbonate, sodium hydrogen carbonate, and potassium hydrogen carbonate) had excellent solubility in water. The carbonate contained in the sample #50 (ethylene carbonate) had poor solubility in water. The carbonate contained in the sample #47 (calcium carbonate), the carbonate contained in the sample #48 (barium carbonate), and the carbonate contained in the sample #49 (propylene carbonate) had substantially no solubility in water.

[0076]

The results of this evaluation test show that it is preferable to use at least one of the carbonates selected among the group consisting of alkali metal carbonates, alkaline earth carbonates, alkali metal bicarbonates, alkaline earth bicarbonates, ammonium carbonate, and ammonium hydrogen carbonate, as the carbonate contained in the first agent. Using such carbonates provides the first agent having the good or excellent solubility in water and the good or excellent reactivity with the acid, thus enhancing the foam formation performance during mixing of the plurality of different agents with each other to the hair cosmetic preparation.

B-5. Results of Experiment 5 (Experiment on pH of Hair Cosmetic Preparation for Hair Dyeing to Brighter Hair Color or Hair Bleaching)

[0077]

Fig. 19 is a table of different samples of the first agent 300 subjected to an experiment on the pH of the hair cosmetic preparation for hair dyeing to the brighter hair color or hair bleaching. Fig. 20 is a table of different samples of the second agent 400 subjected to the experiment on the pH of the hair cosmetic preparation for hair dyeing to the brighter hair color or hair bleaching. Fig. 21 is a table of the results of the experiment on the pH of the hair cosmetic preparation for hair dyeing to the brighter hair color or hair bleaching.

[0078]

The experiment provided a plurality of samples (#60 through #64) by changing the content of ammonia water contained in the first agent and the

content of phosphoric acid contained in the second agent to vary the pH of the resulting hair cosmetic preparation or agent mixture. The samples #60 through #64 were evaluated for the following performances: (5-1) brightness of hair color; and (5-2) foam formation during mixing. The respective samples of this experiment were prepared to provide the hair cosmetic preparations used for hair dyeing to the brighter hair color or for hair bleaching (i.e., changing the hair color from the darker color to the brighter color).

[0079]

(5-1) Brightness of the dyed hair color was evaluated by twenty voluntary subjects. Specifically, 150 grams of each of the hair cosmetic foams or agent mixture foams was applied over the entire hair and washed out after 20-minutes exposure at 25°C. The dyed hair was then dried, and the brightness of the hair color was visually checked and evaluated.

#### Evaluation Criteria for Brightness of Hair Color

- A. Excellent color brightening;
- B. Good color brightening;
- C. Poor color brightening; and
- D. Substantially no color brightening.

[0080]

(5-2) Foam formation during mixing of the first agent with the second agent was evaluated according to the evaluation method and the evaluation criteria described above in "B-4. Results of Experiment 4, (4-1)".

[0081]

According to the results of this evaluation test, the agent mixture of the sample #60 having pH of 6.0 and the agent mixture of the sample #61 having pH of 7.5 had good color brightening and excellent foam formation during mixing of the first agent with the second agent. The agent mixture of the sample #62 having pH of 9.0 had excellent color brightening and good foam formation during mixing of the first agent with the second agent. The agent mixture of the sample #63 having pH of 5.0, however, had substantially no color brightening, while the agent mixture of the sample #64 having pH of 10.0 had substantially no foam formation during mixing of the first agent with the

second agent.

[0082]

The results of this evaluation test show that it is preferable to regulate the pH of the hair cosmetic preparation or the agent mixture used for hair dyeing to the brighter hair color or for hair bleaching in a range of 6.0 to 9.0. Such pH regulation assures the adequate viscosity, as well as the high hair-dyeing or hair-bleaching performance and facilitates the efficient reaction of the carbonate and the acid contained in the hair cosmetic preparation. The combination of the adequate viscosity with the efficient reaction of the carbonate with the acid provides fine, rich, and creamy foam hair cosmetic preparation and prevents dripping in use (during application and during exposure) and uneven hair dyeing.

B-6. Results of Experiment 6 (Experiment on Content of Carbonate in Hair Cosmetic Preparation for Hair Dyeing to Brighter Hair Color or Hair Bleaching)

[0083]

Fig. 22 is a table of the results of the experiment on the content of the carbonate contained in the hair cosmetic preparation for hair dyeing to the brighter hair color or hair bleaching.

[0084]

The experiment provided a plurality of samples (#610 through #615) by changing the total content of potassium carbonate and ammonium hydrogen carbonate as the carbonate in a range of 1.0% by weight to 40.0% by weight in the sample #61 of "B-5. Results of Experiment 5". The samples #610 through #615 were evaluated for the following performances: (6-1) foam formation during mixing; (6-2) overflow from the vessel; and (6-3) usability.

[0085]

(6-1) Foam formation during mixing of the first agent with the second agent was evaluated according to the evaluation method and the evaluation criteria described above in "B-4. Results of Experiment 4, (4-1)".

[0086]

(6-2) Overflow of foam from the mixing vessel during mixing of the first agent with the second agent was visually checked and evaluated.

Evaluation Criteria for Overflow from Vessel

- 5           A. There was no overflow of foam in any mixing condition;  
          B. There was no overflow of foam in careful mixing condition;  
          C. There was slight overflow of foam even in careful mixing condition;  
and  
          D. There was significant overflow of foam even in careful mixing condition.

10   [0087]

(6-3) Usability was evaluated by twenty voluntary subjects as the easiness of application of the hair cosmetic foam or agent mixture foam over the entire hair of a hair dye test doll at 25°C.

Evaluation Criteria for Usability

- 15           A. The foam was well spreadable and easily applied;  
          B. The foam was moderately spreadable and applied without difficulty;  
and  
          C. The foam was not easily applied.

[0088]

- 20           According to the results of this evaluation test, the sample #612 having the total carbonate content of 10.0% by weight had good foam formation during mixing of the first agent with the second agent and had no overflow of foam from the mixing vessel in the careful mixing condition. The sample #612 was well spreadable and easily applied over the hair. The sample #613  
25   having the total carbonate content of 20.0% by weight had good foam formation during mixing of the first agent with the second agent but had slight overflow of foam from the mixing vessel even in the careful mixing condition. The sample #613 was well spreadable and easily applied over the hair. The sample #614 having the total carbonate content of 30.0% by weight had  
30   excellent foam formation during mixing of the first agent with the second agent but had slight overflow of foam from the mixing vessel even in the careful mixing condition. The sample #614 was moderately spreadable and

applied over the hair without difficulty.

[0089]

The sample #610 having the total carbonate content of 1.0% by weight had substantially no foam formation during mixing of the first agent with the second agent. The sample #611 having the total carbonate content of 5.0% by weight had poor foam formation during mixing of the first agent with the second agent and had no overflow of foam from the mixing vessel. The sample #610 was well spreadable in application on the hair. The sample #615 having the total carbonate content of 40.0% by weight had significant overflow of foam from the mixing vessel even in the careful mixing condition of the first agent with the second agent and was not easily applied over the hair.

[0090]

The results of this evaluation test show that it is preferable to adjust the total content of the carbonate contained in the hair cosmetic preparation or the agent mixture used for hair dyeing to the brighter hair color or for hair bleaching to a range of 1.0% by weight to 30.0% by weight. Especially preferable is the carbonate content range of 10.0% by weight to 20.0% by weight. Such adjustment of the total carbonate content in the hair cosmetic preparation provides the adequate self-foaming effect during mixing of the plurality of different agents with each other to the hair cosmetic preparation.

#### B-7. Results of Experiment 7 (Experiment on pH of Hair Cosmetic Preparation for Hair Dyeing to Darker Hair Color)

[0091]

Fig. 23 is a table of different samples of the first agent 300 subjected to an experiment on the pH of the hair cosmetic preparation for hair dyeing to the darker hair color. Fig. 24 is a table of different samples of the second agent 400 subjected to the experiment on the pH of the hair cosmetic preparation for hair dyeing to the darker hair color. Fig. 25 is a table of the results of the experiment on the pH of the hair cosmetic preparation for hair dyeing to the darker hair color.

[0092]

The experiment provided a plurality of samples (#70 through #75) by changing the content of ammonia water contained in the first agent and the content of phosphoric acid contained in the second agent to vary the pH of the resulting hair cosmetic preparation or agent mixture. The samples #70 through #75 were evaluated for the following performances: (7-1) foam formation during mixing; and (7-2) irritation on the scalp. The respective samples of this experiment were prepared to provide the hair cosmetic preparations used for hair dyeing to the darker hair color (i.e., changing the hair color from the brighter color to the darker color).

[0093]

(7-1) Foam formation during mixing of the first agent with the second agent was evaluated according to the evaluation method and the evaluation criteria described above in "B-4. Results of Experiment 4, (4-1)".

[0094]

(7-2) Irritation (soreness or itching) on the scalp was evaluated by twenty voluntary subjects in application of 150 grams of the hair cosmetic foam or agent mixture foam over the entire hair at 25°C.

#### Evaluation Criteria for Irritation on Scalp

- A. The application caused no irritation on the scalp;
- B. The application caused little irritation on the scalp;
- C. The application caused some irritation on the scalp; and
- D. The application caused significant irritation on the scalp.

[0095]

According to the results of this evaluation test, the agent mixture of the sample #71 having pH of 3.25 and the agent mixture of the sample #72 having pH of 6.80 had excellent foam formation during mixing of the first agent with the second agent and caused no irritation on the scalp by application. The agent mixture of the sample #70 having pH of 1.0 had excellent foam formation during mixing of the first agent with the second agent but caused some irritation on the scalp by application. The agent mixture of the sample #73 having pH of 8.80 had good foam formation during mixing of the first agent with the second agent and caused no irritation on the

scalp by application.

[0096]

The agent mixture of the sample #74 having pH of 0.57 caused significant irritation on the scalp by application. The agent mixture of the sample #75 having pH of 9.30 had poor foam formation during mixing of the first agent with the second agent.

[0097]

The results of this evaluation test show that it is preferable to regulate the pH of the hair cosmetic preparation or the agent mixture used for hair dyeing to the darker hair color in a range of 1.0 to 9.0. Especially preferable is the pH range of 3.0 to 7.0. Such pH regulation assures the adequate viscosity, as well as the high hair-dyeing performance and facilitates the efficient reaction of the carbonate and the acid contained in the hair cosmetic preparation. The combination of the adequate viscosity with the efficient reaction of the carbonate with the acid provides fine, rich, and creamy foam hair cosmetic preparation and prevents dripping in use (during application and during exposure) and uneven hair dyeing.

B-8. Results of Experiment 8 (Experiment on Content of Carbonate in Hair Cosmetic Preparation for Hair Dyeing to Darker Hair Color)

[0098]

Fig. 26 is a table of the results of the experiment on the content of the carbonate contained in the hair cosmetic preparation for hair dyeing to the darker hair color.

[0099]

The experiment provided a plurality of samples (#710 through #715) by changing the content of ammonium hydrogen carbonate as the carbonate in a range of 1.0% by weight to 10.0% by weight in the sample #71 of "B-7. Results of Experiment 7". The samples #710 through #715 were evaluated for the following performances: (8-1) foam formation during mixing; (8-2) overflow from the vessel; and (8-3) usability.

[0100]

(8-1) Foam formation during mixing of the first agent with the second agent was evaluated according to the evaluation method and the evaluation criteria described above in "B-4. Results of Experiment 4, (4-1)".

[0101]

5 (8-2) Overflow of foam from the mixing vessel during mixing of the first agent with the second agent was evaluated according to the evaluation method and the evaluation criteria described above in "B-6. Results of Experiment 6, (6-2)".

[0102]

10 (8-3) Usability was evaluated according to the evaluation method and the evaluation criteria described above in "B-6. Results of Experiment 6, (6-3)".

[0103]

According to the results of this evaluation test, the sample #711 having the carbonate content of 1.5% by weight and the sample #712 having the carbonate content of 2.0% by weight had good foam formation during mixing of the first agent with the second agent and had no overflow of foam from the mixing vessel in the careful mixing condition. The samples #711 and #712 were well spreadable and easily applied over the hair. The sample #713 having the carbonate content of 3.0% by weight had excellent foam formation during mixing of the first agent with the second agent but had slight overflow of foam from the mixing vessel even in the careful mixing condition. The sample #713 was well spreadable and easily applied over the hair.

[0104]

25 The sample #710 having the carbonate content of 1.0% by weight had poor foam formation during mixing of the first agent with the second agent but had no overflow of foam from the mixing vessel. The sample #710 was well spreadable in application on the hair. The sample #714 having the carbonate content of 5.0% by weight and the sample #715 having the carbonate content of 10.0% by weight had significant overflow of foam from the mixing vessel even in the careful mixing condition of the first agent with the second agent.

[0105]

The results of this evaluation test show that it is preferable to adjust

the content of the carbonate contained in the hair cosmetic preparation or the agent mixture used for hair dyeing to the darker hair color to a range of 1.5% by weight to 10.0% by weight. Such adjustment of the carbonate content in the hair cosmetic preparation provides the adequate self-foaming effect during mixing of the plurality of different agents with each other to the hair cosmetic preparation.

#### B-9. Results of Experiment 9 (Experiment on Different Higher Alcohol)

[0106]

Fig. 27 is a table of different samples of the first agent 300 subjected to an experiment on the different higher alcohols. Fig. 28 is a table of different samples of the second agent 400 subjected to the experiment on the different higher alcohols. Fig. 29 is a table of the results of the experiment on the different higher alcohols.

[0107]

The experiment provided a plurality of samples (#80 through #89) by changing the alcohol (myristyl alcohol, cetyl alcohol, stearyl alcohol, behenyl alcohol, caprylic alcohol, lauryl alcohol, tetracosanol, myricyl alcohol, caprylyl alcohol, and lacceryl alcohol) contained in the first agent and its content. The samples #80 through #89 were evaluated for the following performances: (9-1) foam retention, (9-2) dripping during application, (9-3) dripping during exposure; (9-4) color brightness; and (9-5) dyeing affinity.

[0108]

(9-1) Foam retention of each of the agent mixtures was evaluated according to the evaluation method and the evaluation criteria described above in "B-1. Results of Experiment 1, (1-1)".

[0109]

(9-2) Dripping during application of each of the agent mixtures was evaluated according to the evaluation method and the evaluation criteria described above in "B-1. Results of Experiment 1, (1-2)".

[0110]

(9-3) Dripping during exposure of each of the agent mixtures was

evaluated according to the evaluation method and the evaluation criteria described above in "B-1. Results of Experiment 1, (1-3)".

[0111]

5 (9-4) Brightness of the dyed hair color was evaluated according to the evaluation method and the evaluation criteria described above in "B-5. Results of Experiment 5, (5-1)".

[0112]

10 (9-5) Dyeing affinity was evaluated by twenty voluntary subjects. Specifically, 150 grams of each of the hair cosmetic foams or agent mixture foams was applied over the entire hair and washed out after 20-minutes exposure at 25°C. The dyed hair was then dried, and the dyeing affinity was visually checked and evaluated.

#### Evaluation Criteria for Dyeing Affinity

- 15 A. Excellent dyeing affinity;
- B. Good dyeing affinity;
- C. Poor dyeing affinity; and
- D. Substantially no dyeing affinity.

[0113]

20 According to the results of this evaluation test, the sample #80 containing myristyl alcohol, the sample #81 containing cetyl alcohol, and the sample #82 containing stearyl alcohol had A levels for all the evaluation points. Each of the samples #80 through #82 had the foam retained even after 100 or more stirs (excellent foam retention), no dripping during application and during exposure, excellent color brightening, and excellent dyeing affinity.

25 The sample #83 containing behenyl alcohol had the foam retained even after 100 or more stirs (excellent foam retention), no dripping during application and during exposure, good color brightening, and excellent dyeing affinity.

[0114]

30 The sample #85 containing lauryl alcohol and the sample #86 containing tetracosanol had B levels for all the evaluation points. Each of the samples #85 and #86 had the foam retained after 50 stirs, substantially no dripping during application, no dripping within 30-minutes exposure, good

color brightening, and good dyeing affinity. The sample #84 containing caprylic alcohol and the sample #87 containing myricyl alcohol had the foam retained after 50 stirs, substantially no dripping during application, and no dripping within 30-minutes exposure but had poor color brightening and poor dyeing affinity.

[0115]

The sample #88 containing caprylyl alcohol and the sample #89 containing lacceryl alcohol had the foam starting disappearing before 50 stirs, dripping during application and during exposure, substantially no color brightening, and poor dyeing affinity.

[0116]

The results of this evaluation test show that it is preferable to add one or more higher alcohols having either a linear alkyl group of 10 to 30 carbon atoms or an alkenyl group of 10 to 30 carbon atoms in at least one agent of the plurality of different agents for the hair cosmetic preparation. The higher alcohol provides the resulting hair cosmetic preparation with adequate hardness and prevents destruction of the foam of carbon dioxide produced by mixing the carbonate and the acid contained in the agents for the hair cosmetic preparation, thus assuring good foam retention. The higher alcohol also provides fine foam hair cosmetic preparation and prevents dripping in use (during application and during exposure) and uneven hair dyeing.

### C. Modifications

[0117]

The invention is not limited to the embodiment and its applications discussed above but may be actualized in diversity of other embodiments and applications within the scope of the invention. Some examples of possible modification are given below.

#### C1. Modified Example 1

[0118]

The embodiment and the experimental examples discussed above refer

to the examples of the components contained in the two-agent-type composition for hair cosmetic preparation (first agent and second agent). The composition for hair cosmetic preparation of the invention is required to comprise at least a first agent containing carbonate(s) and a second agent  
5 containing acid(s) having the function of decomposing the carbonates and is not restricted to any of the embodiment and the experimental examples discussed above. Specifically, the components of the composition for hair cosmetic preparation and their contents may be changed as appropriate.

[0119]

10 In the composition for hair cosmetic preparation of the embodiment, the first agent is prepared to contain the thickener. The thickener is to be contained in at least one agent among a plurality of different agents of the composition for hair cosmetic preparation. For example, in a three-agent-type composition for hair cosmetic preparation, the thickener may be contained in a  
15 third agent. In a two-agent-type composition for hair cosmetic preparation, the thickener may be contained in a second agent. The thickener may be contained in all of the plurality of different agents.

[0120]

In the composition for hair cosmetic preparation of the embodiment,  
20 the first agent is prepared to contain the higher alcohol. The higher alcohol is to be included in at least one agent among a plurality of different agents of the composition for hair cosmetic preparation. For example, in a three-agent-type composition for hair cosmetic preparation, the higher alcohol may be contained in a third agent. In a two-agent-type composition for hair cosmetic  
25 preparation, the higher alcohol may be contained in a second agent. The higher alcohol may be contained in all of the plurality of different agents.

## C2. Modified Example 2

[0121]

30 The hair cosmetic kit 10 of the embodiment is only one illustrative example and may be modified, changed, or altered in various ways. For example, the shapes and the materials of the mixing vessel and the mixing

tool may be changed and modified as appropriate. The mixing vessel may be designed to be integrated with a mixing tool.

### C3. Modified Example 3

5 [0122]

The flowchart of Fig. 2 shows one exemplary flow of the hair cosmetic preparing process using the hair cosmetic kit 10. The hair cosmetic preparing process may be performed according to any other suitable process flow.

### 10 C4. Modified Example 4

[0123]

The flowcharts of Figs. 5 and 6 show exemplary flows of the production processes of the first agent and the second agent. The production processes of the first agent and the second agent may be performed according to any other  
15 suitable process flows. For example, part of the steps in the production process of the first agent may be omitted or may be performed in a different sequence. In order to control foam formation of the carbonate, it is preferable to perform step S220 of adding the alkaline agent (A) components and step S222 of adding the acidic base (C) components in this sequence.

20

### C5. Modified Example 5

[0124]

The above embodiment refers to the hair cosmetic preparation applied on the hair to change the brightness of the hair color. The principle of  
25 the present invention is, however, not restricted to the composition for the hair cosmetic preparation but may be applied to any of various other compositions, for example, a composition for foam cosmetic preparation applied on the body hair to change the brightness of the body hair color.

## CLAIMS

1. A hair cosmetic kit to provide foam hair cosmetic preparation, comprising:

5 a plurality of different agents;  
a mixing vessel for holding the plurality of different agents; and  
a mixing tool for mixing the plurality of different agents held in the mixing vessel,

wherein the plurality of different agents including a first agent and a  
10 second agent, wherein the first agent containing at least a carbonate, wherein the second agent containing an acid having function of decomposing the total carbonate or a part of carbonate,

wherein the plurality of different agents are composed to self-foam when being mixed with each other, and at least one agent among the plurality  
15 of different agents contains a thickener, wherein the amount of the thickener to regulate viscosity of the hair cosmetic preparation in a range of 1,500 mPa·s to 83,000 mPa·s.

2. The hair cosmetic kit in accordance with claim 1, wherein the  
20 thickener is an associative thickener.

3. The hair cosmetic kit in accordance with either one of claims 1 and 2, wherein the carbonate includes at least one carbonate selected among the group consisting of alkali metal carbonates, alkaline earth carbonates, alkali  
25 metal bicarbonates, alkaline earth bicarbonates, ammonium carbonate, and ammonium hydrogen carbonate.

4. The hair cosmetic kit in accordance with claim 1, wherein content of the carbonate in the hair cosmetic preparation is in a range of 1.0% by weight  
30 to 30.0% by weight.

5. The hair cosmetic kit in accordance with claim 1, wherein the hair

cosmetic preparation is used for hair dyeing and has pH in a range of 1.0 to 9.0.

6. The hair cosmetic kit in accordance with claim 1, wherein the hair  
5 cosmetic preparation is used for either hair dyeing or hair bleaching and has pH in a range of 6.0 to 9.0.

7. The hair cosmetic kit in accordance with claim 1, wherein at least one  
agent among the plurality of different agents contains a higher alcohol having  
10 either a linear alkyl group of 10 to 30 carbon atoms or an alkenyl group of 10 to 30 carbon atoms.

8. A production method of a hair cosmetic kit as one of a plurality of  
different agents, which are composed to self-foam and provide foam hair  
15 cosmetic preparation when being mixed with each other, the production method comprising steps of:

producing a first agent, wherein the first agent containing at least a carbonate;

20 producing a second agent, wherein the second agent containing an acid having function of decomposing the total carbonate or a part of carbonate; and

preparing the hair cosmetic kit with a combination of the first agent, the second agent, a mixing vessel for holding the plurality of different agents and a mixing tool for mixing the plurality of different agents held in the mixing vessel,

25 wherein the step of producing the first agent containing:

a first step of mixing a non-acidic base component with a reducing agent component to prepare an emulsion mixture;

a second step of adding an alkaline agent component containing the carbonate to the emulsion mixture of the first step; and

30 a third step of adding an acidic base component to the emulsion mixture of the second step,

wherein a process of at least one of the producing the first agent and

producing the second agent is further including a step of adding a thickener, wherein the amount of the thickener to regulate viscosity of the hair cosmetic preparation in a range of 1,500 mPa·s to 83,000 mPa·s.