

## **【DESCRIPTION】**

### **【Invention Title】**

ADDITIVE COMPOSITION COMPRISING PYRUVATE FOR PREVENTING  
OXIDATION OF VITAMIN C

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### **【Technical Field】**

The present disclosure is directed to providing an additive composition for preventing oxidation of vitamin C in a cosmetic composition which comprises vitamin C.

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### **【Background Art】**

Vitamin C is used frequently in health food because it provides antioxidant effect and enhances immune function. It is also widely used as a useful ingredient of cosmetics because it inhibits skin aging by promoting collagen production and skin  
15 regeneration, provides skin-whitening effect, etc. However, vitamin C is easily denatured by oxidation when exposed to external environments such as oxygen, light, heat, pH, etc. Although glutathione is used as an antioxidant for preventing the oxidation of vitamin C, its content in a cosmetic composition is limited due to the offensive smell of glutathione. Accordingly, development of an antioxidant for  
20 vitamin C that can replace glutathione is necessary.

### **【References of Related Art】**

#### **【Patent Documents】**

(Patent document 1) Korean Patent Publication No. 10-1815225.

## **【Disclosure】**

### **【Technical Problem】**

In an aspect, the present disclosure is directed to providing an additive  
5 composition for preventing oxidation of a composition comprising vitamin C or a  
vitamin C derivative.

### **【Technical Solution】**

The present disclosure provides an additive composition for preventing  
10 oxidation of vitamin C or a vitamin C derivative in a cosmetic composition comprising  
the vitamin C or vitamin C derivative, wherein the additive composition comprises  
pyruvic acid or pyruvate as an active ingredient.

### **【Advantageous Effects】**

15 The present disclosure provides an additive useful for stabilizing vitamin C or  
a vitamin C derivative by preventing oxidation of the vitamin C or vitamin C derivative.  
The pyruvic acid or pyruvate used in the present disclosure exhibits better effect of  
preventing the oxidation of vitamin C or a vitamin C derivative than the previously  
used antioxidant even with a smaller amount.

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### **【Brief Description of Drawings】**

FIG. 1 compares the antioxidant effect of sodium pyruvate as an example of  
the present disclosure and glutathione (GSH) and glyoxylic acid as comparative  
examples.

FIG. 2 shows a standard curve obtained by measuring the degree of oxidation of vitamin C with the lapse of time.

FIG. 3 compares the effect of preventing oxidation of vitamin C of sodium pyruvate as an example of the present disclosure, glutathione (GSH) and glyoxylic acid as comparative examples.

FIG. 4 compares the effect of preventing oxidation of vitamin C of sodium pyruvate as an example of the present disclosure, glutathione (GSH) and glyoxylic acid as comparative examples.

FIG. 5 compares the effect of preventing oxidation of vitamin C depending on the content of sodium pyruvate as an example of the present disclosure.

FIG. 6 compares the effect of preventing oxidation of vitamin C depending on the content of sodium pyruvate as an example of the present disclosure.

FIG. 7 compares the effect of preventing oxidation of vitamin C of pyruvate derivatives as examples of the present disclosure.

FIG. 8 compares the effect of preventing oxidation of vitamin C of pyruvate derivatives as examples of the present disclosure.

FIG. 9 compares the formulation stability of a composition depending on the content of sodium pyruvate as an example of the present disclosure.

FIG. 10 compares the effect of preventing oxidation of vitamin C depending on the contents of vitamin C and sodium pyruvate as an example of the present disclosure.

FIG. 11 compares the effect of preventing oxidation of vitamin C depending on the contents of vitamin C and sodium pyruvate as an example of the present disclosure.

**【Best Mode】**

Hereinafter, the exemplary embodiments of the present disclosure will be described in detail referring to the attached drawings. However, the present disclosure may be embodied into different forms without being limited to the exemplary embodiments described herein. The presented exemplary embodiments are provided such that the present disclosure is thorough and complete and the idea of the present disclosure is sufficiently conveyed to those skilled in the art. Those having ordinary knowledge in the art will be able to embody the idea of the present disclosure into various different forms within the scope of the present disclosure.

In an exemplary embodiment, the present disclosure provides an additive composition for preventing oxidation of vitamin C or a vitamin C derivative in a cosmetic composition comprising the vitamin C or vitamin C derivative, wherein the additive composition comprises pyruvic acid or pyruvate as an active ingredient.

In an exemplary embodiment, the present disclosure provides a cosmetic composition comprising: vitamin C or a vitamin C derivative; and the additive composition.

In the present disclosure, "vitamin C" is also called ascorbic acid and comprises both pure vitamin C and synthetic vitamin C.

In the present disclosure, the vitamin C derivative (ascorbic acid derivative) refers to a compound which is converted to vitamin C in the human body after ingestion. Specifically, the vitamin C derivative comprised in a cosmetic composition of the present disclosure may be a water-soluble vitamin C derivative, although not being limited thereto. More specifically, the vitamin C derivative may comprise one or more selected from a group consisting of sodium ascorbyl phosphate (SAP), magnesium ascorbyl phosphate (MAP), calcium ascorbyl

phosphate, ascorbic acid polypeptide, ethyl ascorbyl ether, ascorbyl dipalmitate, ascorbyl palmitate, ascorbyl stearate, ascorbyl glucoside and ascorbyl ethylsilanol pectinate.

5 In an exemplary embodiment, the vitamin C or vitamin C derivative provides not only antioxidant effect but also skin-whitening effect by protecting skin from UV and preventing pigmentation by inhibiting the activity of tyrosinase. In addition, vitamin C promotes skin regeneration through collagen production and can improves skin wrinkles or elasticity.

10 In the present disclosure, the pyruvate may comprise one or more selected from a group consisting of sodium pyruvate, methyl pyruvate and ethyl pyruvate.

In an exemplary embodiment, the present disclosure may provide a use of pyruvic acid or pyruvate as an active ingredient for preparing an additive composition for preventing oxidation of vitamin C or a vitamin C derivative in a cosmetic composition comprising the vitamin C or vitamin C derivative. In another exemplary  
15 embodiment, the present disclosure may provide a method for preventing oxidation of vitamin C or a vitamin C derivative, which comprises adding an effective amount of pyruvic acid or pyruvate to a cosmetic composition comprising vitamin C or a vitamin C derivative. In another exemplary embodiment, the present disclosure may provide pyruvic acid or pyruvate for use in preventing oxidation of vitamin C or a  
20 vitamin C derivative in a cosmetic composition comprising the vitamin C or vitamin C derivative. In another exemplary embodiment, the present disclosure may provide pyruvic acid or pyruvate as an active ingredient for use in an additive composition for preventing oxidation of vitamin C or a vitamin C derivative in a cosmetic composition comprising the vitamin C or vitamin C derivative.

25 In an exemplary embodiment of the present disclosure, the pyruvic acid or

pyruvate may be added in an amount of 0.001-10 wt% based on the total weight of the cosmetic composition. In an exemplary embodiment of the present disclosure, the pyruvic acid or pyruvate may be added in an amount of 0.01-1 wt% based on the total weight of the cosmetic composition. Specifically, in an exemplary embodiment,

5 the pyruvic acid or pyruvate may be added in an amount of 0.001 wt% or more, 0.01 wt% or more, 0.02 wt% or more, 0.03 wt% or more, 0.04 wt% or more, 0.05 wt% or more, 0.06 wt% or more, 0.07 wt% or more, 0.08 wt% or more, 0.09 wt% or more, 0.1 wt% or more, 0.2 wt% or more, 0.3 wt% or more, 0.4 wt% or more, 0.5 wt% or more, 0.6 wt% or more, 0.7 wt% or more, 0.8 wt% or more, 0.9 wt% or more, 1 wt%

10 or more, 2 wt% or more, 3 wt% or more, 4 wt% or more, 5 wt% or more, 6 wt% or more, 7 wt% or more, 8 wt% or more, 9 wt% or more or 9.99 wt% or more based on the total weight of the cosmetic composition. Also, in an exemplary embodiment, the pyruvic acid or pyruvate may be added in an amount of 10 wt% or less, 9 wt% or less, 8 wt% or less, 7 wt% or less, 6 wt% or less, 5 wt% or less, 4 wt% or less, 3 wt%

15 or less, 2 wt% or less, 1 wt% or less, 0.99 wt% or less, 0.9 wt% or less, 0.8 wt% or less, 0.7 wt% or less, 0.6 wt% or less, 0.5 wt% or less, 0.4 wt% or less, 0.3 wt% or less, 0.2 wt% or less, 0.15 wt% or less, 0.1 wt% or less, 0.09 wt% or less, 0.08 wt% or less, 0.07 wt% or less, 0.06 wt% or less, 0.05 wt% or less, 0.04 wt% or less, 0.03 wt% or less, 0.02 wt% or less or 0.01 wt% or less, based on the total weight of the

20 cosmetic composition. If the addition amount of the pyruvic acid or pyruvate exceeds 10 wt% based on the total weight of the cosmetic composition, the formulation stability of the cosmetic composition may be unsatisfactory. If the addition amount is less than 0.001 wt%, the effect of preventing oxidation of the vitamin C or vitamin C derivative may be insufficient.

25 In the present disclosure, the additive composition may prevent oxidation of

vitamin C or a vitamin C derivative when added to a cosmetic composition comprising the vitamin C or a vitamin C derivative even with a smaller amount of the previously used antioxidant. Accordingly, the efficacy and quality of the cosmetic composition comprising vitamin C or a vitamin C derivative can be maintained for a  
5 long period of time.

In an exemplary embodiment of the present disclosure, the cosmetic composition may comprise vitamin C or a vitamin C derivative in an amount of 1-30 wt% based on the total weight of the cosmetic composition. Specifically, the cosmetic composition may comprise vitamin C or a vitamin C derivative in an amount  
10 of 1 wt% or more, 2 wt% or more, 3 wt% or more, 4 wt% or more, 5 wt% or more, 6 wt% or more, 7 wt% or more, 8 wt% or more, 9 wt% or more, 10 wt% or more, 11 wt% or more, 12 wt% or more, 13 wt% or more, 14 wt% or more, 15 wt% or more, 16 wt% or more, 17 wt% or more, 18 wt% or more, 19 wt% or more, 20 wt% or more, 21 wt% or more, 22 wt% or more, 23 wt% or more, 24 wt% or more, 25 wt% or more, 26  
15 wt% or more, 27 wt% or more, 28 wt% or more or 29 wt% or more, based on the total weight of the cosmetic composition. Also, in an exemplary embodiment, the cosmetic composition may comprise vitamin C or a vitamin C derivative in an amount of 30 wt% or less, 29 wt% or less, 28 wt% or less, 27 wt% or less, 26 wt% or less, 25 wt% or less, 24 wt% or less, 23 wt% or less, 22 wt% or less, 21 wt% or less, 20 wt%  
20 or less, 19 wt% or less, 18 wt% or less, 17 wt% or less, 16 wt% or less, 15 wt% or less, 14 wt% or less, 13 wt% or less, 12 wt% or less, 11 wt% or less, 10 wt% or less, 9 wt% or less, 8 wt% or less, 7 wt% or less, 6 wt% or less, 5 wt% or less, 4 wt% or less, 3 wt% or less, 2 wt% or less or 1 wt% or less, based on the total weight of the cosmetic composition.

25 In an exemplary embodiment of the present disclosure, a weight ratio of the

vitamin C or vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition may be 5-30:0.01-1. Specifically, in an exemplary embodiment, the weight ratio of the vitamin C or vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition may be 10-20:0.01-1.

5 Specifically, in an exemplary embodiment, the weight ratio of the vitamin C or vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition may be 10-20:0.01 or higher, 10-20:0.05 or higher, 10-20:0.1 or higher, 10-20:0.2 or higher, 10-20:0.3 or higher, 10-20:0.4 or higher, 10-20:0.5 or higher, 10-20:0.6 or higher, 10-20:0.7 or higher, 10-20:0.8 or higher or 10-20:0.9 or higher, and may be

10 10-20:1 or lower, 10-20:0.9 or lower, 10-20:0.8 or lower, 10-20:0.7 or lower, 10-20:0.6 or lower, 10-20:0.5 or lower, 10-20:0.4 or lower, 10-20:0.3 or lower, 10-20:0.2 or lower or 10-20:0.1 or lower. Within the above-described ranges of weight ratio, the formulation of the cosmetic composition may be stable while achieving high effect of preventing the oxidation of vitamin C or a vitamin C derivative.

15 In an exemplary embodiment of the present disclosure, the cosmetic composition may be for skin antioxidation, skin whitening, skin wrinkle improvement or skin elasticity improvement. In the present disclosure, the "skin" refers to the tissue covering the body surface of an animal, and is used in the broadest concept, comprising not only the tissue covering the surface of the face, body, etc. but also

20 the scalp and hair.

In an exemplary embodiment of the present disclosure, the cosmetic composition may be formulated by comprising a cosmetologically or dermatologically acceptable medium or base. It can be provided as any topically applicable formulation, e.g., in the form of a solution, a gel, a solid, an anhydrous paste, an oil-

25 in-water emulsion, a suspension, a microemulsion, a microcapsule, a microgranule,

an ionic (liposomal) or non-ionic vesicular dispersion, a cream, a lotion, a powder, an ointment, a spray or a conceal stick. In addition, it may be used in the form of an aerosol composition further comprising a foamy or compressed propellant. These compositions may be prepared according to common methods in the art.

5 In an exemplary embodiment of the present disclosure, the cosmetic composition may further comprise, in addition to the active ingredient, another ingredient which may provide a synergistic effect to the main effect within a range not negatively affecting the main effect. The ingredients other than the active ingredient of the present disclosure may be adequately selected and mixed by those  
10 skilled in the art without difficulty depending on the formulation of the cosmetic composition or the purpose of use. In addition, in an exemplary embodiment, the cosmetic composition of the present disclosure may further comprise other ingredients commonly used in cosmetic compositions, if necessary. Examples may comprise a moisturizer, an emollient, an organic or inorganic pigment, an organic  
15 powder, a UV absorbent, an antiseptic, a sterilizer, an antioxidant, a plant extract, a pH-adjusting agent, an alcohol, a colorant, a flavor, a blood circulation accelerator, a cooling agent, an antiperspirant, purified water, etc. The other ingredients that may be comprised in the cosmetic composition of the present disclosure are not limited to those described above, and they may be used within ranges not negatively affecting  
20 the purpose and effect of the present disclosure.

In an exemplary embodiment of the present disclosure, a composition to which the additive composition is added may be a food composition. For example, it may be processed into a functional food comprising the active ingredient, such as fermented milk, cheese, yogurt, juice, probiotics, health food, and may also be used  
25 in the form of various food additives. In an exemplary embodiment, the composition

may be a health food composition. In an exemplary embodiment, the health food composition may be formulated into a pill, a capsule, a tablet, a granule, a caramel, a drink, etc. In another exemplary embodiment, it may also be processed into the form of a liquid, a powder, a granule, a tablet, a tea bag, etc. The composition may be administered by various methods such as simple drinking, administration by injection, spraying, squeezing, etc. The composition may further comprise another ingredient which may provide a synergistic effect to the main effect within a range not negatively affecting the main effect. For example, it may further comprise an additive for improvement of physical properties, such as a flavor, a pigment, a sterilizer, an antioxidant, an antiseptic, a moisturizer, a thickener, a mineral, an emulsifier, a synthetic polymer, etc. Besides, it may further comprise auxiliary ingredient such as a water-soluble vitamin, an oil-soluble vitamin, a polypeptide, a polysaccharide, a seaweed extract, etc. These ingredients may be adequately selected and mixed by those skilled in the art without difficulty depending on the formulation or the purpose of use. And, their addition amount may be selected within a range not negatively affecting the purpose and effect of the present disclosure. For example, the addition amount of the ingredients may be 0.0001-99.9 wt% based on the total weight of the composition.

In an exemplary embodiment of the present disclosure, the composition to which the additive composition is added may be a pharmaceutical composition. The pharmaceutical composition may further comprise a pharmaceutical adjuvant such as an antiseptic, a stabilizer, a wetting agent, an emulsification accelerator, a salt and/or buffer for control of osmotic pressure, etc. and other therapeutically useful substances.

In an exemplary embodiment, the pharmaceutical composition may be a

formulation for oral administration, and the formulation for oral administration may be, for example, a tablet, a pill, a hard or soft capsule, a liquid, a suspension, an emulsion, a syrup, a powder, a dust, a fine granule, a granule, a pellet, etc. These formulations may comprise, in addition to the active ingredient, a surfactant, a diluent  
5 (e.g., lactose, dextrose, sucrose, mannitol, sorbitol, cellulose and glycine), a glidant (e.g., silica, talc, stearic acid and its magnesium or calcium salt, and polyethylene glycol). The tablet may further comprise a binder such as magnesium aluminum silicate, starch paste, gelatin, tragacanth, methylcellulose, sodium carboxymethyl cellulose and polyvinylpyrrolidone, and may occasionally comprise a pharmaceutical  
10 additive such as a disintegrant, e.g., starch, agar, alginic acid or its sodium salt, an absorbent, a colorant, a flavorant, a sweetener, etc. The tablet may be prepared by a common mixing, granulation or coating method.

In an exemplary embodiment, the pharmaceutical composition may be a formulation for parenteral administration, and the formulation for parenteral  
15 administration may be a formulation for rectal, topical, subcutaneous or transdermal administration. For example, the formulation may be an injection, a medicinal drip, an ointment, a lotion, a gel, a cream, a spray, a suspension, an emulsion, a suppository, a patch, etc., although not being limited thereto.

In an exemplary embodiment, the administration dosage of the  
20 pharmaceutical composition will vary depending on the age, sex and body weight of a subject to be treated, the particular disease or pathological condition to be treated, the severity of the disease or pathological condition, administration route and the discretion of a prescriber. The determination of the administration dosage based on these factors is within the level of those skilled in the art. For example, the  
25 administration dosage may be 1 mg/kg/day to 10 g/kg/day or 5-100 mg/kg/day.

However, the administration dosage does not limit the scope of the present disclosure in any way.

Hereinafter, the present disclosure is described in detail through examples.

5 The examples are provided merely as examples for describing the present disclosure specifically and it will be obvious to those having ordinary knowledge in the art that the scope of the present disclosure is not limited by the examples.

#### [Experimental Example 1] Comparison of antioxidant effect

10 The antioxidant effect of sodium pyruvate (P5280, Sigma Aldrich) as an example of the present disclosure and glutathione (GSH, G6013, Sigma Aldrich) and glyoxylic acid (260150, Sigma Aldrich) known as antioxidants was comparatively evaluated. As the antioxidant effect, the ability of removing  $\text{H}_2\text{O}_2$  was evaluated by FOX (ferrous oxidation-xylenol orange) 2 assay. The measurement of antioxidant  
15 ability by the FOX2 assay is based on the color change from yellow to purple as  $\text{Fe}^{3+}$ -xylenol orange complex is formed as  $\text{Fe}^{3+}$  produced from reaction of  $\text{H}_2\text{O}_2$  with  $\text{Fe}^{2+}$  is bound to xylenol orange. A substance having antioxidant effect reduces the conversion to the purple color by removing  $\text{H}_2\text{O}_2$ . After adding 100  $\mu\text{M}$   $\text{H}_2\text{O}_2$  and each of sodium pyruvate, glutathione and glyoxylic acid at concentrations of 10 ppm,  
20 20 ppm, 50 ppm and 100 ppm, reaction was conducted at 37 °C for 1 hour. Then, the amount of  $\text{H}_2\text{O}_2$  remaining after the reaction was determined by measuring absorbance using a peroxide assay kit (23285, Thermo Scientific).

As shown in FIG. 1, all of sodium pyruvate, glutathione and glyoxylic acid showed superior ability of removing  $\text{H}_2\text{O}_2$  at the concentrations of 10, 20, 50 and 100  
25 ppm. They exhibited similar antioxidant effect.

[Experimental Example 2] Comparison of vitamin C oxidation-preventing effect of different antioxidants

The vitamin C oxidation-preventing effect of sodium pyruvate as an example of the present disclosure and glutathione (GSH) and glyoxylic acid known as antioxidants, which were identified to have similar antioxidant effect in Experimental Example 1, was evaluated comparatively as follows. Since the titer of vitamin C is decreased upon oxidation as its color is changed to yellow, the vitamin C oxidation-preventing effect was compared by identifying the degree of color change of vitamin C by measuring absorbance at 560 nm using a spectrophotometer (SPECTROstar Nano® absorbance plate reader, BMG Labtech). Specifically, after adding 200  $\mu$ L of vitamin C solution (A4403, Sigma Aldrich) to a 96-well plate, a 10% vitamin C aqueous solution was prepared freshly as a blank. While keeping the 10% vitamin C aqueous solution at 40 °C for 8 weeks, the change in the absorbance at 560 nm was measured using the spectrophotometer at weeks 0, 1, 2, 4 and 8. The result is shown in FIG. 2 (OD: optical density). A standard curve was obtained from the experiment.

Then, after preparing the solutions described in Table 1, the change in absorbance was measured for 4 weeks while keeping at 40 °C.

【Table 1】

| INCI                      | Ex. 1  | Ex. 2  | Ex. 3  | Comp.<br>Ex. 1 | Comp.<br>Ex. 2 | Comp.<br>Ex. 3 | Comp.<br>Ex. 4 | Comp.<br>Ex. 5 | Comp.<br>Ex. 6 |
|---------------------------|--------|--------|--------|----------------|----------------|----------------|----------------|----------------|----------------|
| Purified water            | To 100 | To 100 | To 100 | To 100         | To 100         | To 100         | To 100         | To 100         | To 100         |
| Vitamin C (ascorbic acid) | 10     | 10     | 10     | 0.05           | 0.05           | 0.05           | 0.05           | 0.05           | 0.05           |
| Sodium pyruvate           | 0.05   | 0.2    | 1      | -              | -              | -              | -              | -              | -              |

|                   |   |   |   |      |     |   |      |     |   |
|-------------------|---|---|---|------|-----|---|------|-----|---|
| Glutathione (GSH) | - | - | - | 0.05 | 0.2 | 1 | -    | -   | - |
| Glyoxylic acid    | - | - | - | -    | -   | - | 0.05 | 0.2 | 1 |

(Unit: wt%)

As a result, although all of sodium pyruvate, glutathione and glyoxylic acid were shown to have superior antioxidant ability in Experimental Example 1, glyoxylic acid was found to facilitate the oxidation of vitamin C unlike glutathione or sodium pyruvate (see FIG. 3 and FIG. 4). This means that not all the substances known as antioxidants can prevent the oxidation of vitamin C, but the ability of preventing oxidation of vitamin C, i.e., the ability of stabilizing vitamin C, is the unique effect of pyruvate, which is the active ingredient of the present disclosure.

In addition, whereas Comparative Example 1 comprising 0.05 wt% glutathione showed almost no vitamin C oxidation-preventing effect, Example 1 comprising 0.05 wt% sodium pyruvate as the active ingredient of the present disclosure showed higher vitamin C oxidation-preventing effect than Comparative Example 2 comprising 0.2 wt% glutathione. This shows that the pyruvate, which is the active ingredient of the present disclosure, exhibits superior vitamin C oxidation-preventing effect as compared to glutathione, which has been used as an antioxidant for vitamin C, even with a smaller amount.

[Experimental Example 3] Comparison of vitamin C oxidation-preventing effect depending on concentration of pyruvate

The vitamin C oxidation-preventing effect was compared for different concentrations of pyruvate as an example of the present disclosure.

After preparing compositions comprising 10 wt% of pure vitamin C and 0, 0.01, 0.02, 0.05, 0.2 or 1 wt% of sodium pyruvate based on the total weight of the

composition in the same manner as in Experimental Example 2, vitamin C oxidation-preventing effect was compared.

As a result, sodium pyruvate showed vitamin C oxidation-preventing effect at all the concentrations of 0.01-1 wt%, as shown in FIG. 5 and FIG. 6. The increase  
5 of the vitamin C oxidation-preventing effect was slightly decreased when the sodium pyruvate content was 0.2 wt% or higher.

[Experimental Example 4] Comparison of vitamin C oxidation-preventing effect of different pyruvate derivatives

10 The vitamin C oxidation-preventing effect of different pyruvate derivatives was compared.

After preparing compositions comprising 10 wt% of pure vitamin C and 0, 0.05 or 0.2 wt% of sodium pyruvate, methyl pyruvate or ethyl pyruvate based on the total weight of the composition in the same manner as in Experimental Example 2,  
15 vitamin C oxidation-preventing effect was compared.

As a result, all the three pyruvate derivatives showed vitamin C oxidation-preventing effect as shown in FIG. 7 and FIG. 8.

[Experimental Example 5] Comparison of formulation stability of composition  
20 depending on pyruvate content

The formulation stability of compositions depending on the content of pyruvate was compared.

After preparing emulsion-type compositions using vitamin C solution (A4403, Sigma Aldrich) and sodium pyruvate (P5280, Sigma Aldrich) as described in Table 2,  
25 the viscosity of each composition was measured at 30 °C for 2 minutes using the

Brookfield viscometer LVF. The result is shown in FIG. 9 relative to the composition not comprising pyruvate.

【Table 2】

| INCI                      | Comp. Ex. 7 | Ex. 4  | Ex. 5  | Ex. 6  | Ex. 7  | Ex. 8  | Ex. 9  |
|---------------------------|-------------|--------|--------|--------|--------|--------|--------|
| Purified water            | To 100      | To 100 | To 100 | To 100 | To 100 | To 100 | To 100 |
| Vitamin C (ascorbic acid) | 10          | 10     | 10     | 10     | 10     | 10     | 0.05   |
| Sodium pyruvate           | -           | 0.01   | 0.05   | 0.1    | 0.2    | 0.5    | 1      |

(Unit: wt%)

5 As a result, the viscosity of the composition was decreased when the content of pyruvate was 0.5 wt% or higher, suggesting that the composition has good formulation stability when the content of pyruvate is lower than 0.5 wt%.

[Experimental Example 6] Comparison of vitamin C oxidation-preventing  
10 effect depending on vitamin C content

The vitamin C oxidation-preventing effect of pyruvate depending on vitamin C content was compared.

After preparing compositions comprising 10 wt% or 20wt% of pure vitamin C and 0, 0.05, 0.2 or 1 wt% of sodium pyruvate based on the total weight of the  
15 composition in the same manner as in Experimental Example 2, vitamin C oxidation-preventing effect was compared.

As a result, the vitamin C oxidation-preventing effect of pyruvate was confirmed for both 10 wt% and 20 wt% of vitamin C, as shown in FIG. 10 and FIG.  
11.

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The present disclosure may provide the following exemplary embodiments.

A first exemplary embodiment may provide an additive composition for preventing oxidation of vitamin C or a vitamin C derivative in a cosmetic composition comprising the vitamin C or vitamin C derivative, wherein the additive composition comprises pyruvic acid or pyruvate as an active ingredient.

5        A second exemplary embodiment may provide the additive composition according to the first exemplary embodiment, wherein the vitamin C derivative comprises one or more selected from a group consisting of sodium ascorbyl phosphate (SAP), magnesium ascorbyl phosphate (MAP), calcium ascorbyl phosphate, ascorbic acid polypeptide, ethyl ascorbyl ether, ascorbyl dipalmitate,  
10    ascorbyl palmitate, ascorbyl stearate, ascorbyl glucoside and ascorbyl ethylsilanol pectinate.

A third exemplary embodiment may provide the additive composition according to the first and second exemplary embodiments, wherein the pyruvate comprises one or more selected from a group consisting of sodium pyruvate, methyl  
15    pyruvate and ethyl pyruvate.

A fourth exemplary embodiment may provide the additive composition according to the first to third exemplary embodiments, wherein the pyruvic acid or pyruvate is added in an amount of 0.001-10 wt% based on the total weight of the cosmetic composition.

20        A fifth exemplary embodiment may provide the additive composition according to the first to fourth exemplary embodiments, wherein the pyruvic acid or pyruvate is added in an amount of 0.01-1 wt% based on the total weight of the cosmetic composition.

A sixth exemplary embodiment may provide the additive composition  
25    according to the first to fifth exemplary embodiments, wherein a weight ratio of the

vitamin C or vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition is 5-30:0.01-1.

A seventh exemplary embodiment may provide the additive composition according to the first to sixth exemplary embodiments, wherein a weight ratio of the vitamin C or vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition is 10-20:0.01-1.

An eighth exemplary embodiment may provide a cosmetic composition comprising: vitamin C or a vitamin C derivative; and the additive composition according to any of the first to seventh exemplary embodiments.

A ninth exemplary embodiment may provide a use of pyruvic acid or pyruvate as an active ingredient for preparing an additive for preventing oxidation of vitamin C or a vitamin C derivative in a cosmetic composition comprising the vitamin C or vitamin C derivative.

A tenth exemplary embodiment may provide the use according to the ninth exemplary embodiment, wherein the vitamin C derivative comprises one or more selected from a group consisting of sodium ascorbyl phosphate (SAP), magnesium ascorbyl phosphate (MAP), calcium ascorbyl phosphate, ascorbic acid polypeptide, ethyl ascorbyl ether, ascorbyl dipalmitate, ascorbyl palmitate, ascorbyl stearate, ascorbyl glucoside and ascorbyl ethylsilanol pectinate.

An eleventh exemplary embodiment may provide the use according to any of the ninth and tenth exemplary embodiments, wherein the pyruvate comprises one or more selected from a group consisting of sodium pyruvate, methyl pyruvate and ethyl pyruvate.

A twelfth exemplary embodiment may provide the use according to any of the ninth to eleventh exemplary embodiments, wherein the pyruvic acid or pyruvate is

added in an amount of 0.001-10 wt% based on the total weight of the cosmetic composition.

A thirteenth exemplary embodiment may provide the use according to any of the ninth to twelfth exemplary embodiments, wherein the pyruvic acid or pyruvate is added in an amount of 0.01-1 wt% based on the total weight of the cosmetic composition.

A fourteenth exemplary embodiment may provide the use according to any of the ninth to thirteenth exemplary embodiments, wherein a weight ratio of the vitamin C or vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition is 5-30:0.01-1.

A fifteenth exemplary embodiment may provide the use according to any of the ninth to fourteenth exemplary embodiments, wherein a weight ratio of the vitamin C or vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition is 10-20:0.01-1.

A sixteenth exemplary embodiment may provide a method for preventing oxidation of vitamin C or a vitamin C derivative, wherein the method comprises adding an effective amount of pyruvic acid or pyruvate to a cosmetic composition comprising the vitamin C or vitamin C derivative.

A seventeenth exemplary embodiment may provide the method according to the sixteenth exemplary embodiment, wherein the vitamin C derivative comprises one or more selected from a group consisting of sodium ascorbyl phosphate (SAP), magnesium ascorbyl phosphate (MAP), calcium ascorbyl phosphate, ascorbic acid polypeptide, ethyl ascorbyl ether, ascorbyl dipalmitate, ascorbyl palmitate, ascorbyl stearate, ascorbyl glucoside and ascorbyl ethylsilanol pectinate.

An eighteenth exemplary embodiment may provide the method according to

any of the sixteenth and seventeenth exemplary embodiments, wherein the pyruvate comprises one or more selected from a group consisting of sodium pyruvate, methyl pyruvate and ethyl pyruvate.

5 A nineteenth exemplary embodiment may provide the method according to any of the sixteenth to eighteenth exemplary embodiments, wherein the pyruvic acid or pyruvate is added in an amount of 0.001-10 wt% based on the total weight of the cosmetic composition.

10 A twentieth exemplary embodiment may provide the method according to any of the sixteenth to nineteenth exemplary embodiments, wherein the pyruvic acid or pyruvate is added in an amount of 0.01-1 wt% based on the total weight of the cosmetic composition.

15 A twenty-first exemplary embodiment may provide the method according to any of the sixteenth to twentieth exemplary embodiments, wherein a weight ratio of the vitamin C or vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition is 5-30:0.01-1.

20 A twenty-second exemplary embodiment may provide the method according to any of the sixteenth to twenty-first exemplary embodiments, wherein a weight ratio of the vitamin C or vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition is 10-20:0.01-1.

A formulation example according to an exemplary embodiment of the present disclosure is described below. However, the present disclosure is not limited thereto.

#### [Formulation Example 1]

25 A cream-type cosmetic composition was prepared as described in Table 3

according to a common method.

【Table 3】

| Ingredients                                                                                 | Contents (wt%) |
|---------------------------------------------------------------------------------------------|----------------|
| Sodium pyruvate                                                                             | 1.00           |
| Vitamin C                                                                                   | 1.00           |
| Carnauba wax                                                                                | 0.60           |
| Glyceryl stearate & PEG-100 stearate                                                        | 1.50           |
| Cetearyl alcohol                                                                            | 0.80           |
| Glyceryl stearate                                                                           | 1.00           |
| Behenyl alcohol                                                                             | 1.00           |
| Polyglyceryl-3 methylglucose distearate                                                     | 2.50           |
| Tocopherol & phytosteryl/behenyl/octyldodecyl lauroyl glutamate                             | 0.50           |
| Pentaerythrityl tetraethylhexanoate                                                         | 4.50           |
| Hydrogenated C <sub>6-14</sub> olefin polymer                                               | 5.00           |
| Butylene glycol dicaprylate/dicaprate                                                       | 2.50           |
| Dimethicone                                                                                 | 1.00           |
| Disodium EDTA                                                                               | 0.05           |
| Glycerin                                                                                    | 3.00           |
| Propanediol                                                                                 | 7.00           |
| 1,2-Hexandiol                                                                               | 1.00           |
| Glyceryl caprylate                                                                          | 0.10           |
| Tocopherol & ethylhexylglycerin                                                             | 0.05           |
| Purified water & sorbitan isostearate & polyacrylate-13 &<br>polyisobutene & polysorbate 20 | 0.70           |

|                |         |
|----------------|---------|
| Purified water | Balance |
|----------------|---------|

Although the present disclosure has been described with specific exemplary embodiments, the description does not limit the scope of the present disclosure. Accordingly, those of ordinary skill in the art can make various modifications, changes and substitutions without departing from the contents and scope of the present disclosure.

## **【CLAIMS】**

### **【Claim 1】**

An additive composition for preventing oxidation of vitamin C or a vitamin C derivative in a cosmetic composition comprising the vitamin C or vitamin C derivative,  
5 wherein the additive composition comprises pyruvic acid or pyruvate as an active ingredient.

### **【Claim 2】**

The additive composition according to claim 1, wherein the vitamin C  
10 derivative comprises one or more selected from a group consisting of sodium ascorbyl phosphate (SAP), magnesium ascorbyl phosphate (MAP), calcium ascorbyl phosphate, ascorbic acid polypeptide, ethyl ascorbyl ether, ascorbyl dipalmitate, ascorbyl palmitate, ascorbyl stearate, ascorbyl glucoside and ascorbyl ethylsilanol pectinate.

15

### **【Claim 3】**

The additive composition according to claim 1, wherein the pyruvate comprises one or more selected from a group consisting of sodium pyruvate, methyl pyruvate and ethyl pyruvate.

20

### **【Claim 4】**

The additive composition according to claim 1, wherein the pyruvic acid or pyruvate is added in an amount of 0.001-10 wt% based on the total weight of the cosmetic composition.

**【Claim 5】**

The additive composition according to claim 1, wherein the pyruvic acid or pyruvate is added in an amount of 0.01-1 wt% based on the total weight of the cosmetic composition.

**【Claim 6】**

The additive composition according to claim 1, wherein a weight ratio of the vitamin C or vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition is 5-30:0.01-1.

**【Claim 7】**

The additive composition according to claim 1, wherein a weight ratio of the vitamin C or vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition is 10-20:0.01-1.

**【Claim 8】**

A cosmetic composition comprising:  
vitamin C or a vitamin C derivative; and  
the additive composition according to any of claims 1 to 7.

**【Claim 9】**

A use of pyruvic acid or pyruvate as an active ingredient for preparing an additive for preventing oxidation of vitamin C or a vitamin C derivative in a cosmetic

composition comprising the vitamin C or vitamin C derivative.

**【Claim 10】**

The use according to claim 9, wherein the vitamin C derivative comprises  
5 one or more selected from a group consisting of sodium ascorbyl phosphate (SAP),  
magnesium ascorbyl phosphate (MAP), calcium ascorbyl phosphate, ascorbic acid  
polypeptide, ethyl ascorbyl ether, ascorbyl dipalmitate, ascorbyl palmitate, ascorbyl  
stearate, ascorbyl glucoside and ascorbyl ethylsilanol pectinate.

10 **【Claim 11】**

The use according to claim 9, wherein the pyruvate comprises one or more  
selected from a group consisting of sodium pyruvate, methyl pyruvate and ethyl  
pyruvate.

15 **【Claim 12】**

The use according to claim 9, wherein the pyruvic acid or pyruvate is added  
in an amount of 0.001-10 wt% based on the total weight of the cosmetic composition.

**【Claim 13】**

20 The use according to claim 9, wherein the pyruvic acid or pyruvate is added  
in an amount of 0.01-1 wt% based on the total weight of the cosmetic composition.

**【Claim 14】**

The use according to claim 9, wherein a weight ratio of the vitamin C or

vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition is 5-30:0.01-1.

**【Claim 15】**

5           The use according to claim 9, wherein the wherein a weight ratio of the vitamin C or vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic composition is 10-20:0.01-1.

**【Claim 16】**

10           A method for preventing oxidation of vitamin C or a vitamin C derivative, the method comprising adding an effective amount of pyruvic acid or pyruvate to a cosmetic composition comprising the vitamin C or vitamin C derivative.

**【Claim 17】**

15           The method according to claim 16, wherein the vitamin C derivative comprises one or more selected from a group consisting of sodium ascorbyl phosphate (SAP), magnesium ascorbyl phosphate (MAP), calcium ascorbyl phosphate, ascorbic acid polypeptide, ethyl ascorbyl ether, ascorbyl dipalmitate, ascorbyl palmitate, ascorbyl stearate, ascorbyl glucoside and ascorbyl ethylsilanol  
20   pectinate.

**【Claim 18】**

          The method according to claim 16, wherein the pyruvate comprises one or more selected from a group consisting of sodium pyruvate, methyl pyruvate and

ethyl pyruvate.

**【Claim 19】**

The method according to claim 16, wherein the pyruvic acid or pyruvate is  
5 added in an amount of 0.001-10 wt% based on the total weight of the cosmetic  
composition.

**【Claim 20】**

The method according to claim 16, wherein the pyruvic acid or pyruvate is  
10 added in an amount of 0.01-1 wt% based on the total weight of the cosmetic  
composition.

**【Claim 21】**

The method according to claim 16, wherein a weight ratio of the vitamin C or  
15 vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic  
composition is 5-30:0.01-1.

**【Claim 22】**

The method according to claim 16, wherein a weight ratio of the vitamin C or  
20 vitamin C derivative and the pyruvic acid or pyruvate comprised in the cosmetic  
composition is 10-20:0.01-1.