

【DESCRIPTION】

【Invention Title】

GINSENOSIDE FATTY ACID ESTER COMPOUND, METHOD FOR PREPARING SAME, AND COSMETIC COMPOSITION COMPRISING SAME

【Technical Field】

The present application claims priority to and the benefit of Korean Patent Application No. 10-2015-0137302 filed on September 30, 2015, the entire contents of which are incorporated herein by reference.

The present invention relates to a novel ginsenoside fatty acid ester compound having skin whitening and antioxidative effect, a method for preparing thereof, and a cosmetic composition comprising the same.

【Background Art】

Ginseng (*Panax ginseng* C.A. Meyer) is a plant belonging to the genus Ginseng of the family *Araliaceae*, is a herbal medicine that has been used in Korea, China, Japan, etc., for over 2,000 years and has been used empirically to prevent disease and prolong the life span. The efficacy and effects of ginseng so far known include actions on the central nervous system, anticarcinogenic and anticancer activities, immune function-regulating action, antidiabetic action, hyperfunction of liver function, improvement of cardiovascular disorders and anti-arteriosclerosis, blood pressure control action, improvement of

menopausal disorder, effect on osteoporosis, anti-stress and anti-fatigue action, antioxidant activity, Anti-aging efficacy and the like.

The various efficacy and effects of the above-mentioned ginseng are due to a component called 'ginsenoside' (glycoside contained in ginseng, known as a saponin), which is a type of saponin. The ginsenosides have a structure in which a sugar is attached to steroid skeleton, and the structure is changed by heat. Steroid-sugar bonds are cleaved by heating by steam, and as sugars fall off, ginsenosides exhibit different effects with each other depending on which sugar is left at any number of positions. Also, as the water-soluble sugars are cleaved off and thus the ginsenosides become lipid-soluble, which makes them easy to pass through cell membranes.

There are more than 30 kinds of ginsenosides, and they do not all have the same ingredients and efficacy. Among them, ginsenoside F1 and ginsenoside compound K are suggested as effective ingredients for cosmetic composition. The compounds have a structure in which one sugar (glucoside) is attached to protopanaxadiol, which is one of the saponin components of ginseng.

It is known that the ginsenoside F1 can protect human HaCaT keratinocytes by down-regulating the expression of Bcl-2 and Brn-3a from allergic inhibition and apoptosis by irradiation with ultraviolet B (Lee EH, et al., *J. Invest. Dermatol.*

121:607-13, 2003). Korean Patent Publication No. 2014-0013796 discloses that ginsenoside F1 is useful as an external preparation for skin, since it has antioxidant ability, anti-inflammatory effect and skin moisturizing effects.

In addition, Korean Patent No. 10-0485326 and No. 10-1427572 discloses that ginsenoside compound K promotes the production of hyaluronic acid and thus is applicable to external dermatological compositions. And Korean Patent Publication No. 2015-0083290 discloses that compound K has whitening and wrinkle improvement effects.

In addition, Korean Patent No. 10-1440039 discloses that ginsenoside F1 or compound K protects the epidermal dermal boundary of the skin to prevent skin aging and improve wrinkles, and thus can be used as a composition for external application for skin.

As mentioned above, when the ginsenoside F1 or compound K is applied to cosmetic composition, various effects including skin whitening effect and antioxidant effect (anti-aging, wrinkle improvement) can be obtained.

Meanwhile, in terms of the structure of the skin, the intercellular space and the corneum, which is the outermost layer, are mostly composed of lipids and the surface of the skin is covered with sebum (oil component) secreted by the cells. Unfortunately, it is difficult for the hydrophilic substance to penetrate through the skin. For penetration of the hydrophilic

substance, it is necessary to increase the use concentration or to apply an electric shock such as iontophoresis.

The ginsenoside F1 or the compound K has a structure in which a sugar is linked to an alcoholic OH group by an ether bond, and thus has a large hydrophilicity and a large molecular weight. Accordingly, the penetration ability of the ginsenoside F1 or compound K through the skin is very low. Therefore, even if the cosmetic composition contains these compounds, the amount of penetration or absorption into the skin is small and thus the effect which is substantially obtained is insufficient.

[Prior Art Literature]

[Patent Literature]

(Patent Literature 1) Korean Patent Publication No. 2014-0013796, "Cosmetic Composition Comprising of ginsenoside F1 for improving inflammatory diseases"

(Patent Literature 2) Korean Publication No. 2013-0095949, "Composition of skin external application containing ginsenoside F1"

(Patent Literature 3) Korean Patent No. 10-0485326, "Promoter for the production of hyaluronic acid containing ginsenoside compound K"

(Patent Literature 4) Korean Patent No. 10-1427572, "Skin external composition for promoting the production of hyaluronic acid containing ginsenoside Re and ginsenoside compound K"

(Patent Literature 5) Korean Patent Publication No. 2015-0083290, "Method for preparing ginsenoside derivative and composition comprising ginsenoside derivative prepared by the same for whitening and improving wrinkle"

(Patent Literature 6) Korean Patent No. 10-1140039, "A composition that contains ginsenoside F1 and/orCompound K for skin external application"

[Non-Patent Literature]

(Non-Patent Literature 1) Lee E H, *et al*, F1 significantly reduced ultraviolet-B-induced cell death and protected HaCaT cells from apoptosis caused by ultraviolet B irradiation. Ultraviolet-B-induced apoptosis is related with ginsenoside-F1-mediated inhibition of ultraviolet-B-induced down-regulation of Bcl-2 and Brn-3a expression, *J. Invest. Dermatol*, 121:607-13, 2003

【Disclosure】

【Technical Problem】

In order to solve the above problem, the inventors of the present invention prepared a novel compound by reacting the ginsenoside F1 or compound K with a fatty acid vinyl ester compound to increase its hydrophobicity, and identified that the compound thus obtained has superior penetration ability to the corneum, inhibits the production of melanic pigment, exhibits a skin whitening effect, significantly inhibits

collagenase, MMP-1, and thus exhibits a superior wrinkle improvement effect, thereby completing the present invention.

Accordingly, it is an object of the present invention to provide a novel ginsenoside fatty acid ester compound.

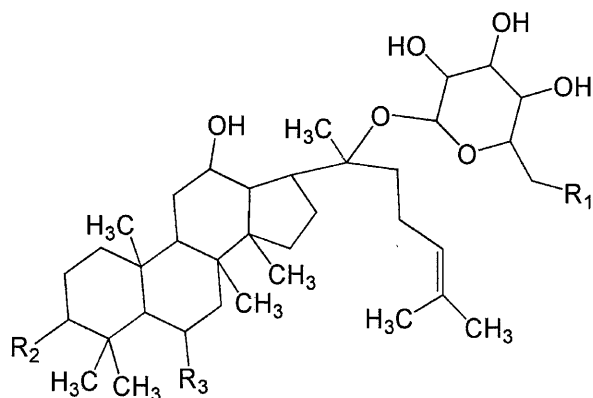
In addition, it is another object of the present invention to provide a method for preparing the ginsenoside fatty acid ester compound.

In addition, it is still another object of the present invention to provide an use of the ginsenoside fatty acid ester compound as a cosmetic composition.

【Technical Solution】

According to an object of the present invention, the present invention provides a ginsenoside fatty acid ester compound represented by the following Formula 1:

[Formula 1]

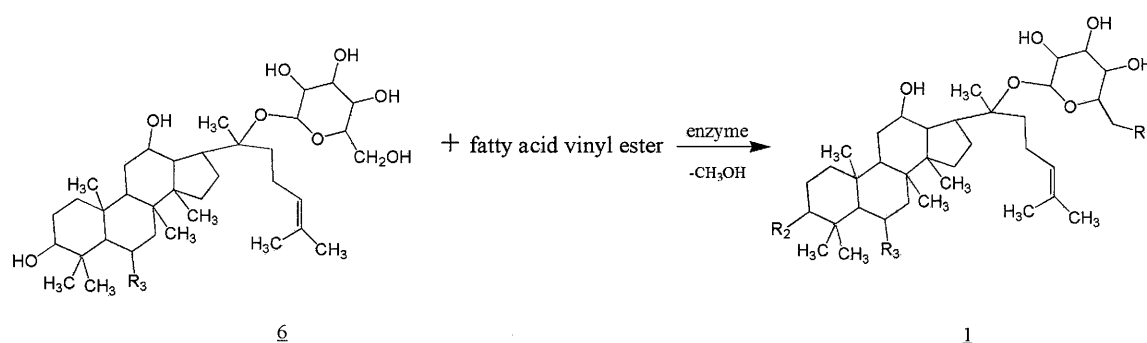


wherein R₁ to R₃ are as described in the specification.

According to another object of the present invention, the present invention provides a method for preparing a ginsenoside fatty acid ester compound of Formula 1, which comprises reacting

a compound of Formula 6 and a saturated or unsaturated fatty acid vinyl ester compound of C12 to C22 by an enzyme conversion reaction as represented by the following Reaction Scheme 1:

[Reaction Scheme 1]



wherein R₁ to R₃ are as described in the specification.

According to still another object of the present invention, the present invention also provides a cosmetic composition comprising the ginsenoside fatty acid ester compound represented by Formula 1 as an active ingredient.

【Advantageous Effects】

The ginsenoside fatty acid ester compound according to the present invention not only has whitening effect and wrinkle improvement effect which are exhibited by the conventional ginsenoside F1 or compound K, but also has skin penetration ability through the corneum by improving hydrophobicity.

Specifically, the compound suppresses the production of melanic pigment by acting on tyrosinase, an enzyme that produces melanic pigment that causes freckles and stains, and thus exhibiting skin whitening effect. And the compound can inhibit

expression of MMP-1, an enzyme that degrades collagen, more significantly than retinoic acid, thereby resulting in wrinkle improvement effect. Therefore, the compound can be formulated into various cosmetic products, thereby enhancing the satisfaction of consumers.

【Description of Drawings】

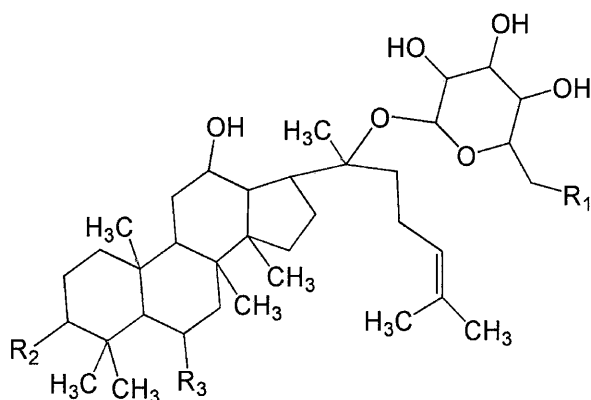
Fig. 1 is a graph showing MMP-1 inhibitory effect of compounds of example 1 and comparative example 1.

【Best Mode】

Hereinafter, the present invention will be described in detail.

The present invention provides a novel compound which is modified to have hydrophobicity in order to increase the skin absorbency of a ginsenoside F1 or compound K. Preferably, the novel compound is a ginsenoside fatty acid ester compound represented by the following Formula 1:

[Formula 1]



wherein R_1 is a saturated or unsaturated fatty acid group of C12 to C22,

R_2 is OH or a saturated or unsaturated fatty acid group of C12 to C22 and

R_3 is H or OH.

The saturated fatty acid group of C12 to C22 as used herein may be a lauryl group (C12:0), a tridecyl group (C13:0), a myristyl group (C14:0), a pentadecyl group (C15:0), a palmityl group (C16:0), a margaryl group (C17:0), a stearyl group (C18:0), a nonadecyl group (C19:0), an arachidyl group (C20:0), a heneicosyl group (C21:0) or a behenyl group (C22:0).

Also, the unsaturated fatty acid group of C12 to C22 as used herein may be a palmitoleyl group (C16:1), an oleyl group (C18:1), a myristoleyl group (C14:1), a linoleyl group (C18:2) or an arachidonyl group (C20:3).

Preferably, R_1 may be a palmityl group, a stearyl group or an oleyl group, more preferably OH or a palmityl group.

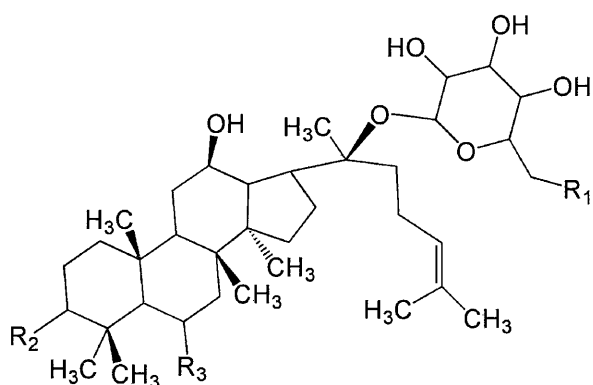
Also, preferably, R_2 may be OH, a palmityl group, a stearyl group or an oleyl group, more preferably a palmityl group.

The compound of Formula 1 of the present invention may include all isomers unless specifically stated otherwise. As the isomers, all stereoisomers, for example, isomers (including enantiomers, which may exist even in the absence of asymmetric carbon and partial stereoisomers) which may exist due to the asymmetric carbon on the various R and Z substituents may be

contemplated within the scope of the present invention. Each stereoisomer of the compound of the present invention may, for example, be substantially free of other isomers, or may exist, for example, as a racemate, or may be mixed with all stereoisomers or selected stereoisomers.

For example, the compound of the present invention may be represented by the isomer of Formula 1a:

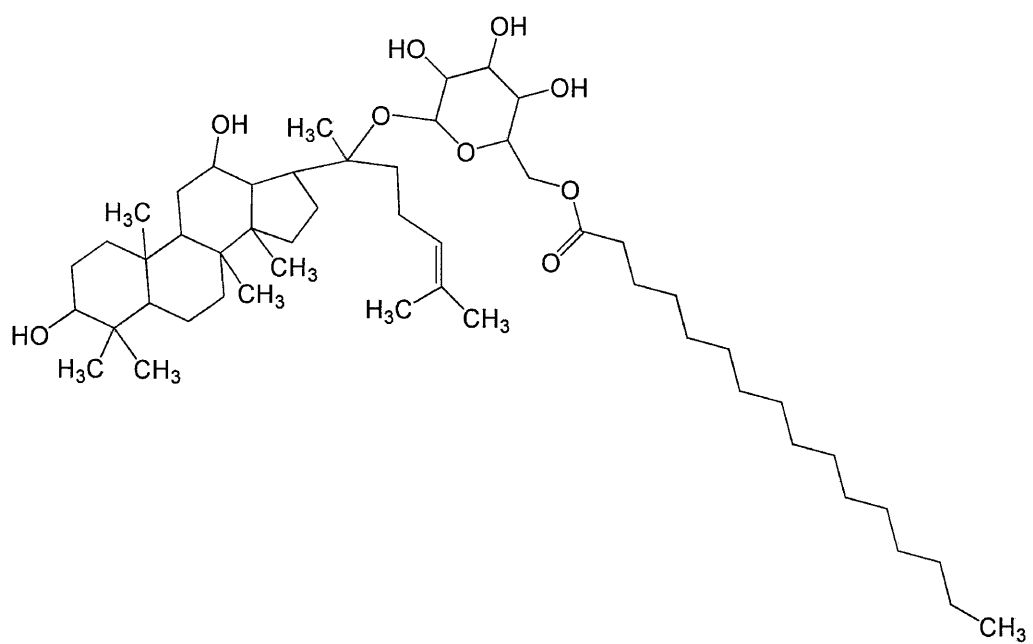
[Formula 1a]



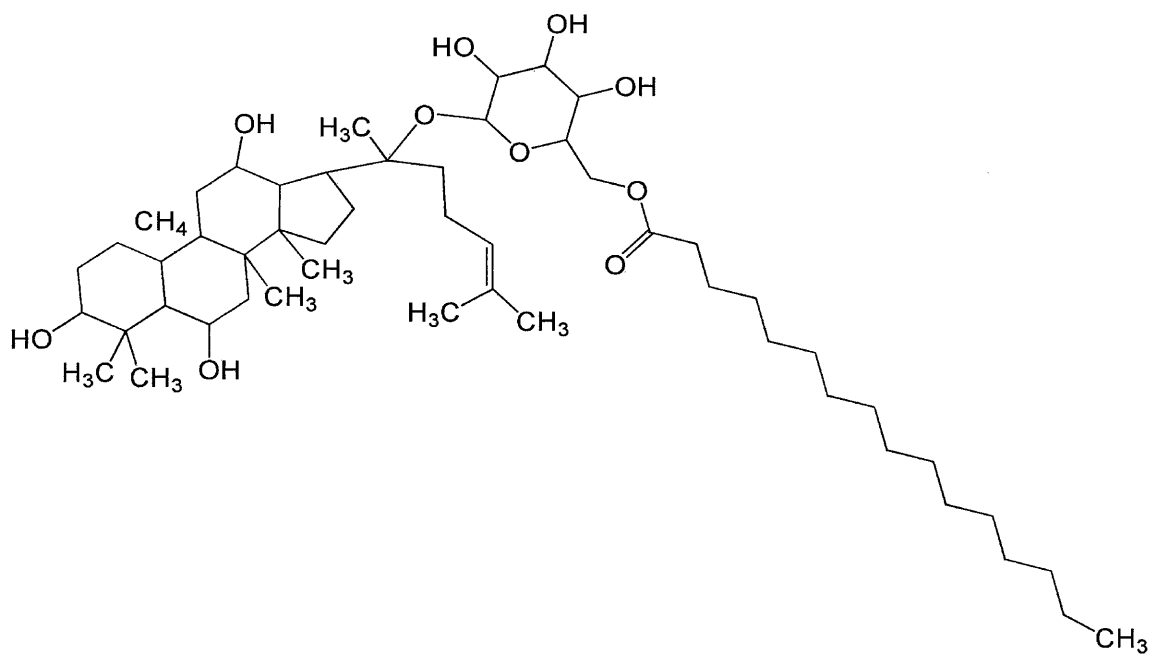
wherein, R_1 to R_3 is as defined above.

Examples of the compounds represented by Formula 1 may include the following compounds:

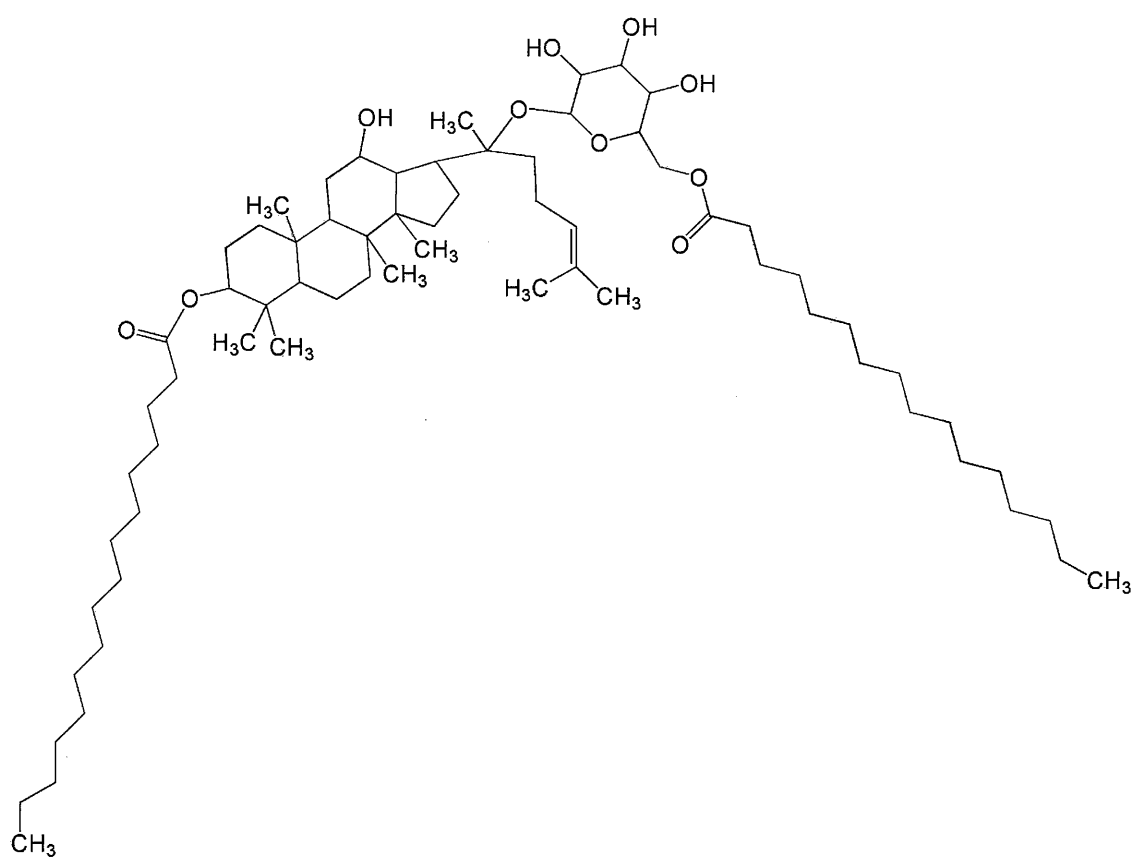
[Formula 2]



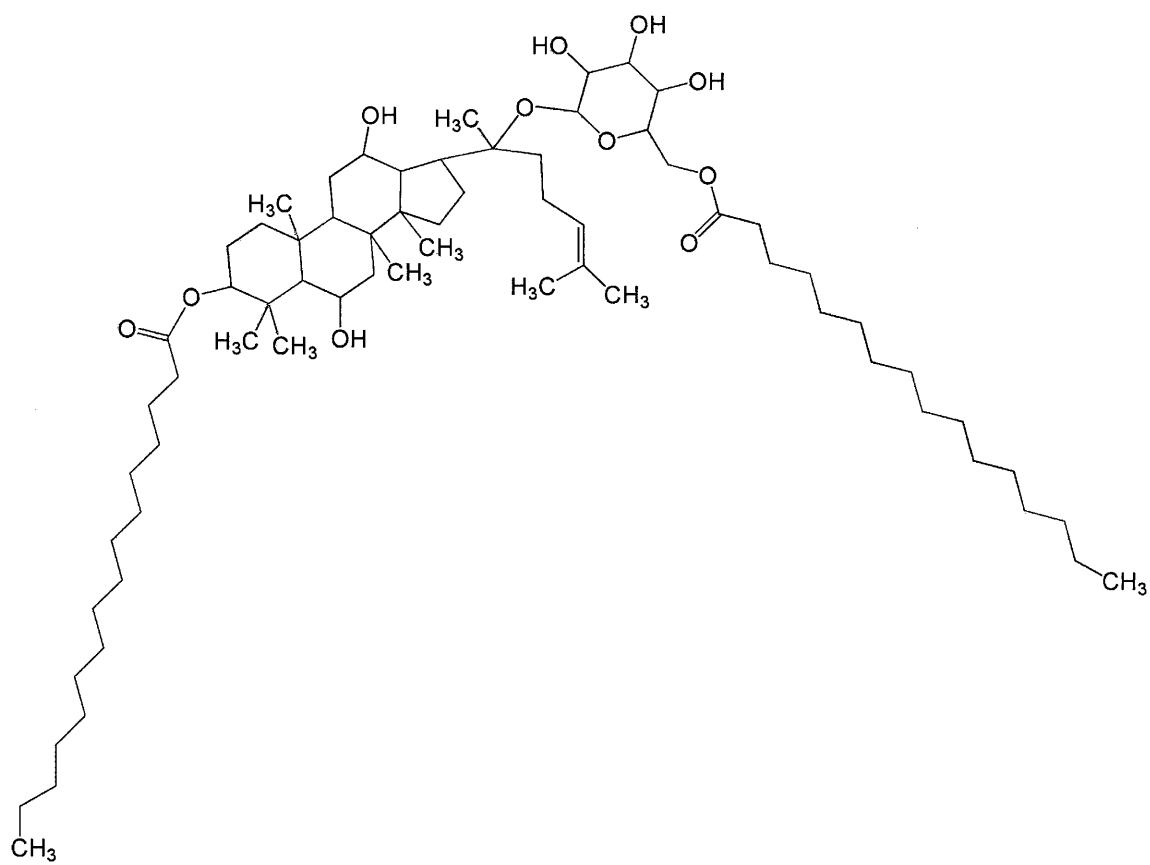
[Formula 3]



[Formula 4]

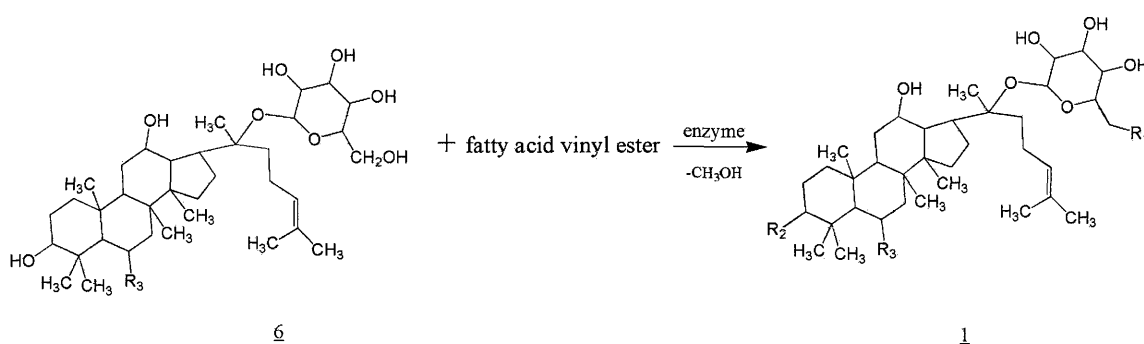


[Formula 5]



In addition, the present invention provides a method for preparing a ginsenoside fatty acid ester compound of Formula 1, which comprises reacting a compound of Formula 6 and a saturated or unsaturated fatty acid vinyl ester compound of C12 to C22 by an enzyme conversion reaction as represented by the following Reaction Scheme 1:

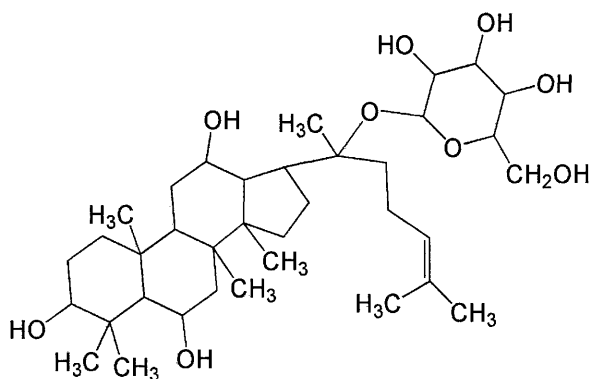
[Reaction Scheme 1]



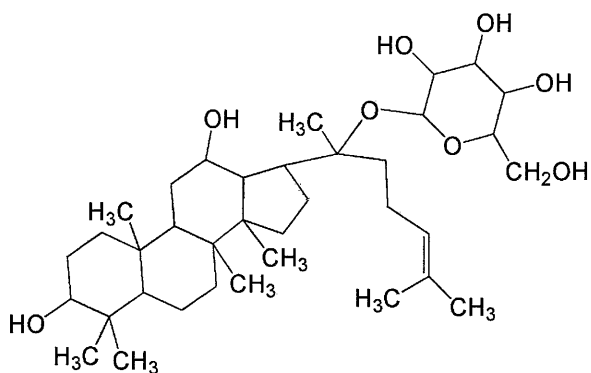
wherein R₁ to R₃ are as defined above.

The compound of Formula 6, which is the starting material in Reaction Scheme 1, may be a ginsenoside compound. For example, the compound of Formula 6 may be ginsenoside F1 (R₃ = OH) represented by Formula 7, compound K (R₃ = H) represented by Formula 8 or derivatives thereof.

[Formula 7]



[Formula 8]



The starting materials can be obtained from extracts from ginseng, red ginseng, white ginseng, fresh ginseng(susam), misam(gingseng tail), ginseng leaves, ginseng fruit or the like, or can be directly prepared therefrom, or is commercially available.

As an example, the starting materials can be prepared by hydrolyzing ginseng purified saponin with acid, alkali or enzyme to remove sugar from ginseng saponin and then passing the reaction solution through a silica column. Examples of the enzymes that can be used herein may include exo-glycosidases such as β -glucosidase, α,β -arabinosidase and α,β -rhamnosidase which degrade the saponin-sugar bond, and complex enzymes containing them, etc.

Also, in Reaction Scheme 1, the fatty acid vinyl ester compound may be a saturated or unsaturated fatty acid vinyl ester compound of C12 to C22 as a compound for introducing R₁ and R₂ into the chemical structure of Formula 1.

Preferably, the saturated fatty acid vinyl ester compound of C12 to C22 may be lauric acid vinyl ester (C12: 0), tridecylic acid vinyl ester (C13: 0), myristic acid vinyl ester (C14: 0), pentadecylic acid vinyl ester (C15: 0), palmitic acid vinyl ester (C16: 0), margaric acid vinyl ester (C17: 0), stearic acid vinyl ester (C18: 0), nonadecylic acid vinyl ester (C19: 0), arachidic acid vinyl ester (C20: 0), heneicosylic acid vinyl ester (C21: 0) or behenylic acid vinyl ester (C22: 0).

The unsaturated fatty acid vinyl ester compound of C12 to C22 may be palmitoleic acid vinyl ester (C16:1), oleic acid vinyl ester (C18:1), myristoleic acid vinyl ester (C14:1), linoleic acid vinyl ester (C18:2) or arachidonic acid vinyl ester (C20:3).

More preferably, the fatty acid vinyl ester compound may be palmitic acid vinyl ester, stearic acid vinyl ester or oleic acid vinyl ester, and most preferably palmitic acid vinyl ester.

The reaction may proceed by an enzyme conversion reaction.

The enzymes may be hydrolytic enzymes such as *protease* or *lipase*, and the examples of the hydrolytic enzymes may include *flavourzyme*, *protease A*, *alcalase*, *savinase*, *protamex*, *esperase*, *novozyme*, *esterase*, *acylase* and mixtures thereof, but not limited thereto. Also, as the enzyme source, a microorganism containing the hydrolytic enzyme may be used. Preferably, in the example of the present invention, *novozyme 435* (Novozymes) was used.

The examples of the enzyme source may include *Bacillus* sp., *Aspergillus oryzae*, *Aspergillus niger*, *Candida antarctica* and mixtures thereof, but any strain or microorganism containing hydrolytic enzymes can be used without limitation.

The type and using method of the enzyme in Reaction Scheme 1 are not particularly limited as long as the enzyme does not inactivate, and a method commonly used in this field is possible.

The reaction temperature is a temperature at which no inactivation of the enzyme occurs, that is, in the case of novozymes, the reaction may be carried out with stirring in the range of from 20 to 60 °C for 1 to 120 hours, preferably 36 to 72 hours.

In the reaction, the solvent used may be water, a lower alcohol such as methanol, ethanol, propanol or the like. As the organic solvent, acetone, dimethylformamide (DMF), methylene chloride (MC), diisopropyl ether, diethyl ether, tetrahydrofuran (THF), dimethylacetamide (DMA), dimethylsulfoxide (DMSO), chlorobenzene, toluene, benzene, etc., may be used alone or in combination, and acetone is preferably used.

The ginsenoside fatty acid ester compound of the Formula 1 according to the present invention can be applied to various fields and is preferably used as an effective ingredient of a cosmetic composition.

The ginsenoside fatty acid ester compound of Formula 1 is a ginsenoside compound, especially a ginsenoside K and compound K that shows hydrophobicity and thus excellent permeability to the corneum while intactly maintaining the whitening effect and wrinkle improvement effect of ginsenoside PPD and PPT.

In addition, as the ginsenoside fatty acid ester compound of the present invention exhibits hydrophobicity and thus has improved reactivity with tyrosinase, an enzyme that produces melanic pigment that causes freckles and stains. Therefore, as shown in Experimental Example 1, the ginsenoside fatty acid ester compound of the present invention can obtain an excellent whitening effect as compared with conventional kojic acid or lucinol having excellent whitening effect.

Additionally, as a result of measuring the inhibitory effect of expression of MMP-1, an enzyme that degrades collagen(see Experimental Example 2), it can be seen that the ginsenoside fatty acid ester compound of the present invention inhibits the expression of MMP-1 more significantly than retinoic acid, thereby ensuring the wrinkle improvement effect.

Therefore, the ginsenoside fatty acid ester compound of Formula 1 can be used as an active ingredient of cosmetic compositions. The content thereof varies depending on the formulation and may be 0.001 to 99% by weight. When the active ingredient is contained in the above described range, such an amount is not only suitable for exhibiting the intended effect

in the present invention but also can satisfy both stability and solubility of the composition. Even from the viewpoint of cost effectiveness, it may be appropriate that the active ingredient is included in the above range.

The cosmetic composition may be prepared as any formulation conventionally prepared in the art, and for example, can be formulated, but is not limited thereto, into solution, suspension, emulsion, paste, gel, cream, lotion, powder, oil, powder foundation, emulsion foundation, wax foundation and spray, etc. Specifically, the cosmetic composition may be prepared as a formulations of sun cream, softening lotion, astringent lotion, nourishing lotion, nourishing cream, massage cream, essence, eye cream, pack, spray or powder.

In addition, the cosmetic composition according to the present invention may contain additives conventionally used in the field of cosmetics or dermatology, such as fatty substances, organic solvent, solubilizers, thickeners, gelling agents, softener, antioxidants, suspending agents, stabilizers, foaming agent, air freshener, surfactants, water, ionic or nonionic type emulsifiers, fillers, metal ion sequestrants, chelating agents, preservatives, vitamin, blocking agents, wetting agents, essential oil, dyes, pigment, hydrophilic or lipophilic active agents, lipid vesicle or any other ingredient commonly used in cosmetics. The additives may be introduced in amounts commonly used in the field of cosmetics or dermatology.

When the formulation is a paste, a cream or a gel, animal oil, vegetable oil, wax, paraffin, starch, tragacanth, cellulose derivative, polyethylene glycol, silicone, bentonite, silica, talc, zinc oxide or the like may be used as a carrier component.

When the formulation is a powder or a spray, lactose, talc, silica, aluminum hydroxide, calcium silicate, polyamide powder or the like may be used as a carrier component. Particularly, in the case of the spray, it may further comprise propellants such as chlorofluorohydrocarbons, propane/butane or dimethyl ether.

When the formulation is a solution or a emulsion, a solvent, a solubilizing agent or an emulsifying agent may be used as a carrier component, and examples thereof may include water, ethanol, isopropanol, ethyl carbonate, ethyl acetate, benzyl alcohol, benzyl benzoate, propylene glycol, 1,3-butyl glycol oil, glycerol aliphatic ester and fatty acid esters of polyethylene glycol or sorbitan.

When the formulation is a suspension, liquid diluents such as water, ethanol or propylene glycol, suspending agents such as ethoxylated isostearyl alcohol, polyoxyethylene sorbitol ester and polyoxyethylene sorbitan ester, microcrystalline cellulose, aluminum metahydroxide, bentonite, agar or tragacanth, etc., can be used as a carrier component.

Hereinafter, the present invention will be described in more detail by the following examples. It is to be understood, however, that the following examples are illustrative of the

present invention only and are not intended to limit the scope of the present invention.

Example 1: Preparation of compound of Formula 2

To a pressure tube, the compound of Formula 8 (compound K, 1eq), vinyl palmitate (2.5 eq), 4Å molecular sieve (100 wt.%), Novozyme 435 and anhydrous acetone (500 wt.%, 5 times the substrate) were added and stirred at 45 °C for 3 days to conduct the reaction.

After completion of the reaction, the obtained product was purified by silica gel column chromatography (ethyl acetate: methanol = 10:1) to obtain a compound of Formula 2 (white solid, yield 75%).

¹H-NMR(300MHz, CDCl₃) d 7.27(1H), 5.78(1H), 5.28(2H), 5.16(1H), 5.02(1H), 4.77(1H), 4.42(1H), 4.15(1H), 4.04(1H), 3.93(1H), 3.83(1H), 3.56-3.47(3H), 2.44(2H), 2.35(3H), 2.21(1H), 2.15(1H), 2.06(1H), 1.90-1.87(3H), 1.80-1.78(2H), 1.72-1.61(13H), 1.57-1.41(5H), 1.31-1.25(14H), 1.16(4H), 1.07-1.00(4H), 0.93-0.88(12H).

Example 2: Preparation of compound of Formula 3

The compound of Formula 3 was prepared by the same procedure as Example 1, except that the compound of Formula 7 (ginsenoside F1, 1 eq) was used as the starting material (yield 85%).

¹H-NMR(300MHz, CDCl₃) d 7.27(1H), 5.74(1H), 5.26-5.16(4H), 5.02(1H), 4.77(1H), 4.42(1H), 4.27-4.15(2H), 4.02(2H), 3.83(1H), 3.56(1H), 3.51(1H), 3.37(1H), 2.43(2H), 2.34(3H), 2.21-2.06(3H), 1.92(1H), 1.79-1.61(17H), 1.57(3H), 1.41-1.35(8H), 1.31-1.27(23H), 1.2-1.12(2H), 1.04-0.74(13H).

Example 3: Preparation of compound of Formula 4

The compound of Formula 4 was prepared by the same procedure as Example 1, except that the compound of Formula 8 (compound K, 2 eq) was used as the starting material (yield 89%).

¹H-NMR(300MHz, CDCl₃) d 7.27(1H), 5.74(1H), 5.26-5.16(4H), 5.02(1H), 4.77(1H), 4.42(1H), 4.27-4.15(2H), 4.02(2H), 3.83(1H), 3.56(1H), 3.51(1H), 3.37(1H), 2.43(2H), 2.34(3H), 2.21-2.06(3H), 1.92(1H), 1.79-1.61(17H), 1.57(3H), 1.41-1.35(8H), 1.31-1.27(23H), 1.2-1.12(2H), 1.04-0.74(13H).

Example 4: Preparation of compound of Formula 5

The compound of Formula 5 was prepared by the same procedure as Example 1, except that the compound of Formula 7 (ginsenoside F1, 2 eq) was used as the starting material (yield 88%).

¹H-NMR(300MHz, CDCl₃) d 7.27(1H), 5.74(1H), 5.26-5.16(4H), 5.02(1H), 4.77(1H), 4.42(1H), 4.27-4.15(2H), 4.02(2H), 3.83(1H), 3.56(1H), 3.51(1H), 3.37(1H), 2.43(2H), 2.34(3H), 2.21-2.06(3H), 1.92(1H), 1.79-1.61(17H), 1.57(3H), 1.41-1.35(8H), 1.31-1.27(23H), 1.2-1.12(2H), 1.04-0.74(13H).

Experimental Example 1: Melanin production inhibitory effect in melanic pigment-producing cells

The melanin production inhibitory effect in melanic pigment-producing cells of the compound prepared in example 2 was measured by Dooley's method.

The cell line used was mouse-derived B16 F10 (melanoma cells) purchased from Korean Cell Line Bank. DMEM (Cat No. 11995), FBS (Cat No. 16000-044) and antibiotic-antifungal agent (Cat No. 15240-062) required for cell culture were purchased from Invitrogen (GIBCO).

The cell lines were cultured under the conditions of 37 °C and 5% CO₂. The cultured B16F10 cells were removed with 0.05% trypsin-EDTA and inoculated again in the same number (1X10⁴ cells/well) into a 48-well plate, and then the medium was replaced three consecutive days from the second day by the medium containing the compounds of each example at a concentration of 10 ppm. At this time, kojic acid and rucinol were used as comparative examples.

After 5 days, the cells were treated with 1N NaOH and reacted at 60 °C for 2 hours to dissolve the melanin contained in the cells, and then the amount of melanin was measured by measuring the absorbance at 405 nm. From this, the concentration of the compounds required to reduce the melanocyte-induced

melanin production by half (IC₅₀) was calculated and the results are shown in the table below.

Table 1:

Tested substance	IC ₅₀
Kojic acid	>500 μ M
Rucinol	16 μ M
Compound of Example 1	7.8 μ M
Compound of Example 2	7.2 μ M
Compound of Example 3	7.5 μ M
Compound of Example 4	7.4 μ M

Referring to Table 1, the compounds according to the present invention can inhibit melanin production even in a small amount as compared with kojic acid and lucinol. Accordingly, it can be seen that the ginsenoside fatty acid ester compounds according to the present invention inhibit melanin production and thus have an excellent skin whitening effect.

Experimental Example 2: Inhibitory effect of MMP-1 expression

In order to evaluate the inhibitory effect on MMP-1 expression of ginsenoside fatty acid ester compound, the fibroblasts were plated in 24 well plates at 1×10^4 cells per well and cultured in medium containing 10% FBS for about 24 hours until about 80% confluency was reached. Thereafter, the medium was replaced with a medium without FBS and then cultured for 24 hours.

For UV irradiation, the cells were washed once with PBS, and then UVB 15 mJ/cm² was irradiated with addition of 100 ml of

PBS. After removing the PBS, the ginsenoside fatty acid ester compound prepared in Example 2 was diluted to a final concentration of 0.01, 0.05, 0.1 and 0.5% in a fresh medium without the FBS, and retinoic acid was used as a comparative example 1. After 48 hours of treatment with the test substance, the culture supernatant was collected and the expression of MMP-1 was evaluated using an ELISA kit (enzyme-linked immunosorbent assay kits; RPN 2610, Biotrak Amersham Pharmacia Biotech, UK). The amount of each measured MMP-1 was corrected for the total amount of protein, and the results are shown in Table 2 and FIG. 1. At this time, FIG. 1 is a graph comparing MMP-1 inhibition ratio of compounds of example 1 and comparative example 1.

Table 2: Inhibition ratio (%) of MMP-1 expression

Concentration (%)	Example 1	Example 2	Example 3	Example 4	Comparative Example 1
0	100	100	100	100	100
0.01	97.9	97	97.1	97.5	98.1
0.05	77.1	75.1	79.5	80.1	87.3
0.1	64.3	65.5	63.4	66.7	82.5
0.5	40.7	42.5	43.2	45.5	72.2

Referring to Table 2 and FIG. 1, it can be seen that the ginsenoside fatty acid ester compound according to the present invention inhibits the expression of MMP-1 more significantly than the retinoic acid of Comparative Example 1.

From these results, it can be seen that the ginsenoside fatty acid ester compound proposed in the present invention inhibits skin aging and has an effect on wrinkle improvement by

inhibiting the biosynthesis of MMP-1, a skin tissue degrading enzyme caused by internal aging or external environmental factors.

Hereinafter, another Formulation Examples of the present invention will be described. However, the cosmetic formulation containing the ginsenoside fatty acid ester compound according to the present invention is not limited to these examples.

Formulation Example 1: Lotion

The lotion was prepared according to the conventional method with the composition shown in the following table.

Table 3:

Component	Content (% by weight))
Compound of Example 1	0.1
Glycerin	3.0
Butylene glycol	2.0
Propylene glycol	2.0
Carboxyvinyl polymer	0.1
PEG 12 Nonyl phenyl ether	0.2
Polysorbate 80	0.4
Ethanol	10.0
Triethanolamine	0.1
Preservative, Coloring, Flavoring	appropriate amount
Purified water	remainder

Formulation Example 2: Nourishing cream

The nourishing cream was prepared according to the conventional method with the composition shown in the following table.

Table 4:

Component	Content (% by weight)
Compound of Example 1	2.0

Polysorbate 60	1.5
Sorbitan sesquioleate	0.5
PEG 60 Hydrogenated castor oil	2.0
Liquid paraffin	10.0
Squalane	5.0
Caprylic/capric triglyceride	5.0
Glycerin	5.0
Butylene glycol	3.0
Propylene glycol	3.0
Triethanolamine	0.2
Preservative, Coloring, Flavoring	appropriate amount
Purified water	remainder

Formulation Example 3: Massage cream

The massage cream was prepared according to the conventional method with the composition shown in the following table.

Table 5:

Component	Content (% by weight)
Compound of Example 1	1.0
Beewax	10.0
Polysorbate 60	1.5
PEG 60 Hydrogenated castor oil	2.0
Sorbitan sesquioleate	0.8
Liquid paraffin	40.0
Squalane	5.0
Caprylic/capric triglyceride	4.0
Glycerin	5.0
Butylene glycol	3.0
Propylene glycol	3.0
Triethanolamine	0.2
Preservative, Coloring, Flavoring	appropriate amount
Purified water	remainder

Formulation Example 4: Pack

The pack was prepared according to the conventional method with the composition shown in the following table.

Table 6:

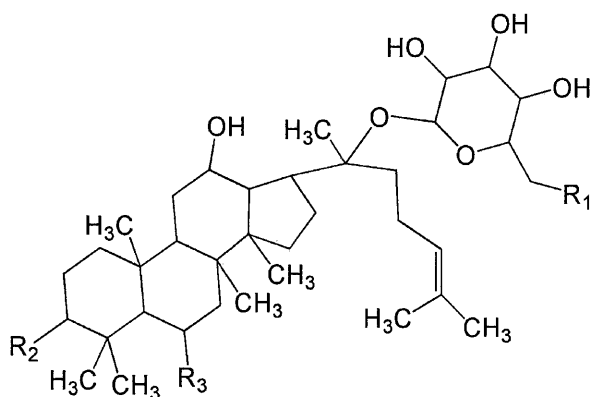
Component	Content (% by weight)
Compound of Example 1	0.2
Polyvinyl alcohol	13.0
Sodium carboxymethyl cellulose	0.2
Glycerin	5.0
Allantoin	0.1
Ethanol	6.0
PEG 12 Nonyl phenyl ether	0.3
Polysorbate 60	0.3
Preservative, Coloring, Flavoring	appropriate amount
Purified water	remainder

【CLAIMS】

【Claim 1】

A ginsenoside fatty acid ester compound represented by the following Formula 1:

[Formula 1]



wherein R₁ is saturated or unsaturated fatty acid group of C12 to C22,

R₂ is OH or saturated or unsaturated fatty acid group of C12 to C22 and

R₃ is H or OH.

【Claim 2】

The ginsenoside fatty acid ester compound of claim 1, wherein R₁ is a lauryl group, a tridecyl group, a myristyl group, a pentadecyl group, a palmityl group, a margaryl group, a stearyl group, a nonadecyl group, an arachidyl group, a heneicosyl group, a behenyl group, a palmitoleyl group, an oleyl group, a myristoleyl group, a linoleyl group or an arachidonyl group,

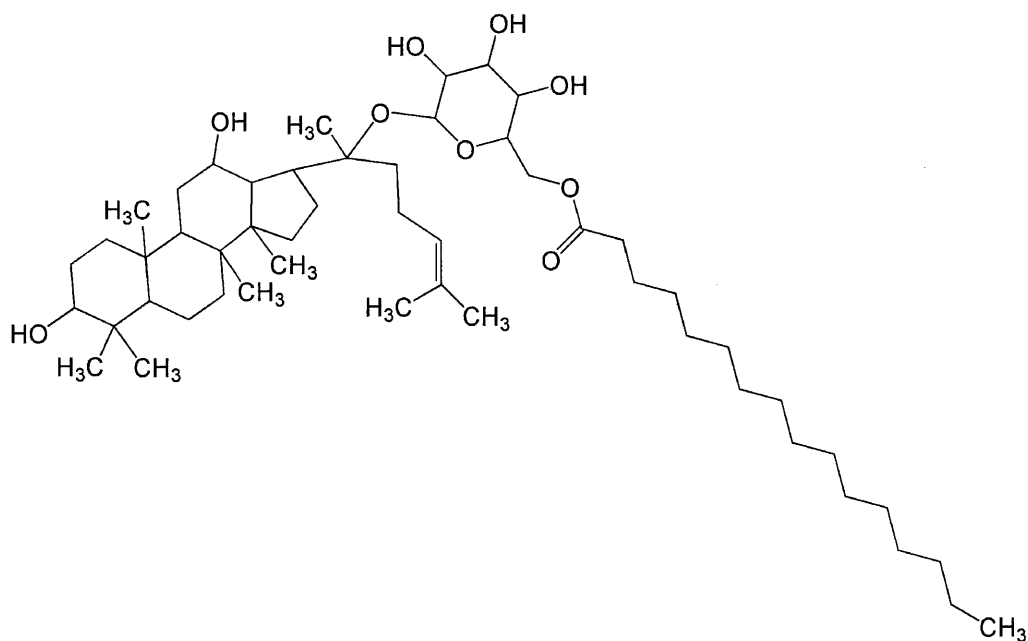
R₂ is OH, a lauryl group, a tridecyl group, a myristyl group, a pentadecyl group, a palmityl group, a margaryl group, a stearyl group, a nonadecyl group, an arachidyl group, a heneicosyl group, a behenyl group, a palmitoleyl group, an oleyl group, a myristoleyl group, a linoleyl group or an arachidonyl group and

R₃ is H or OH.

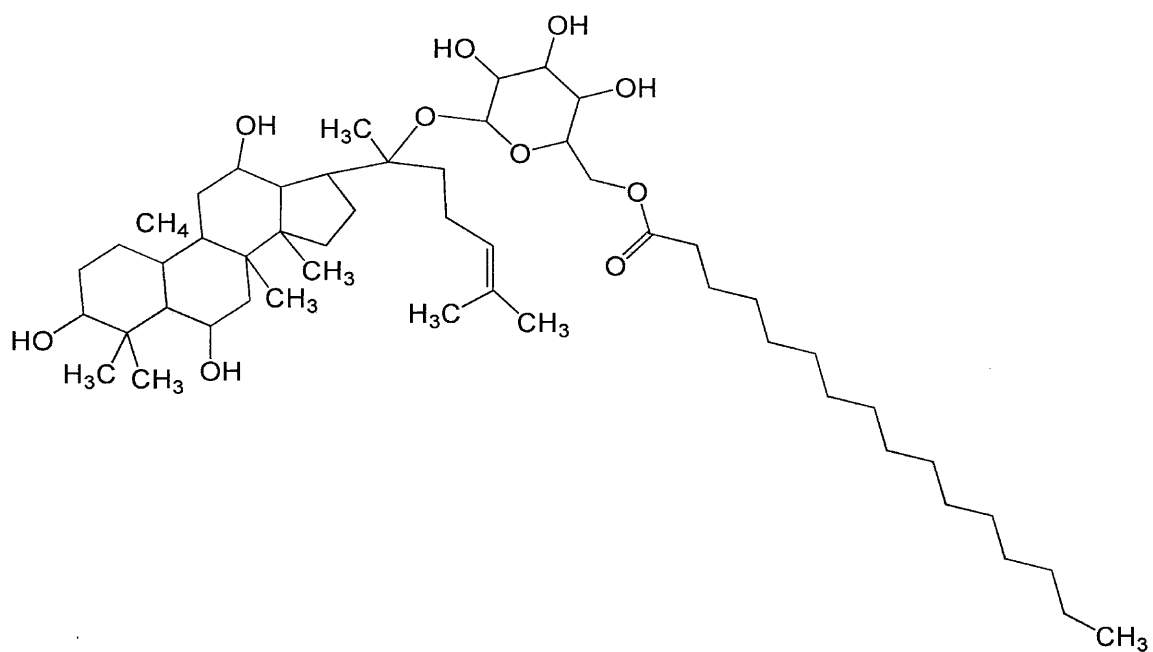
【Claim 3】

The ginsenoside fatty acid ester compound of claim 1, wherein the ginsenoside fatty acid ester compound is one of the compounds represented by the following Formulas 2 to 5:

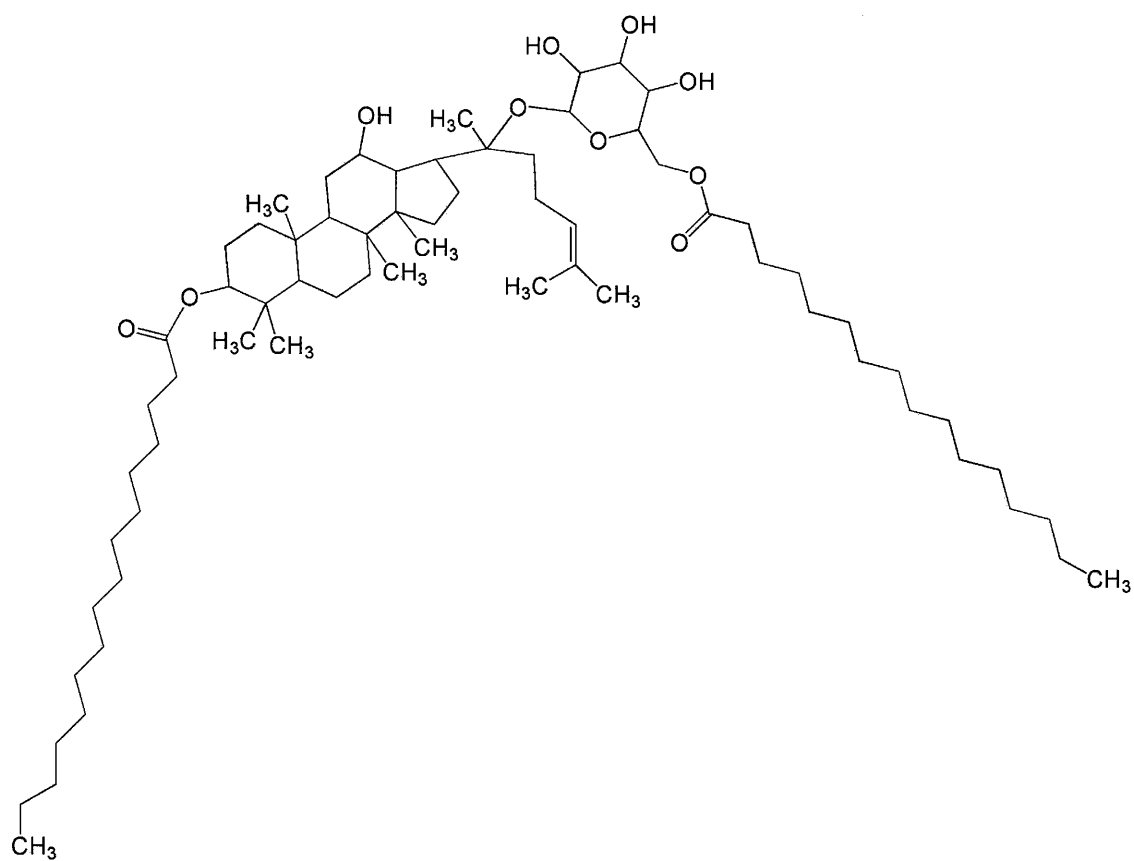
[Formula 2]



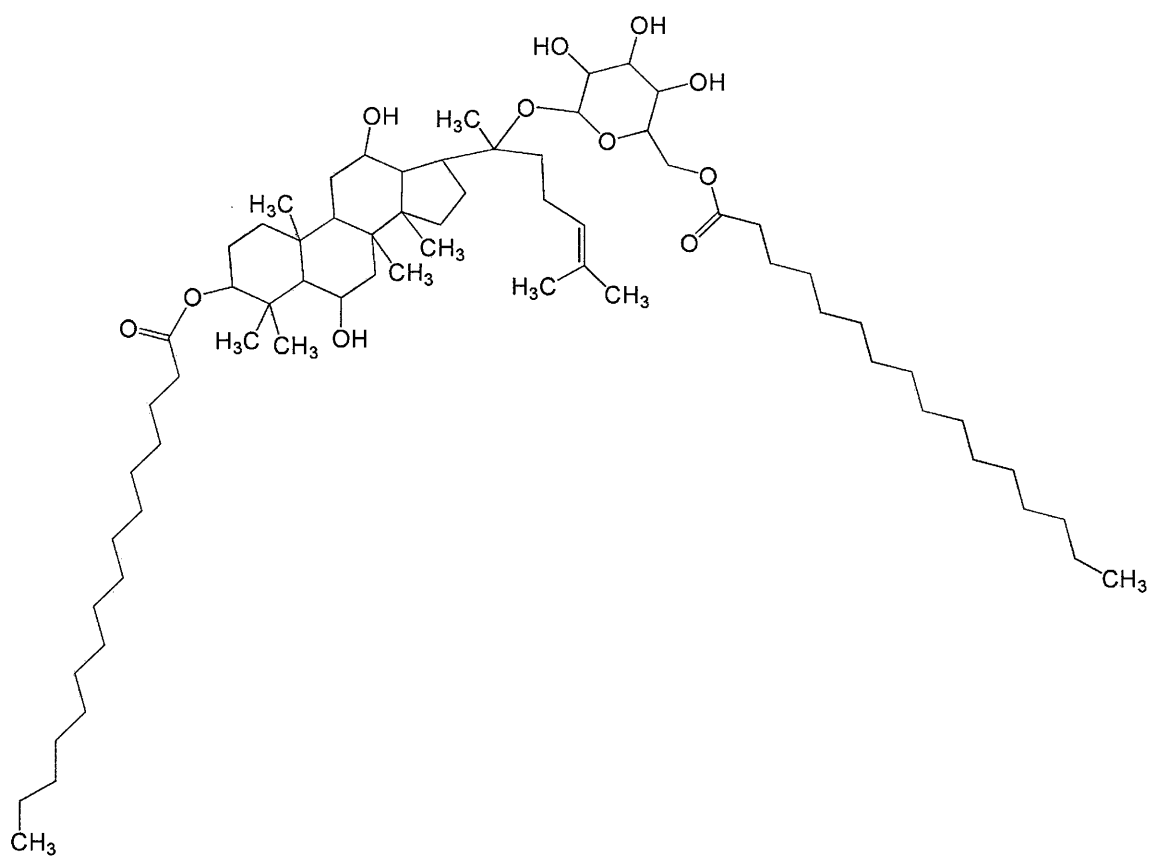
[Formula 3]



[Formula 4]



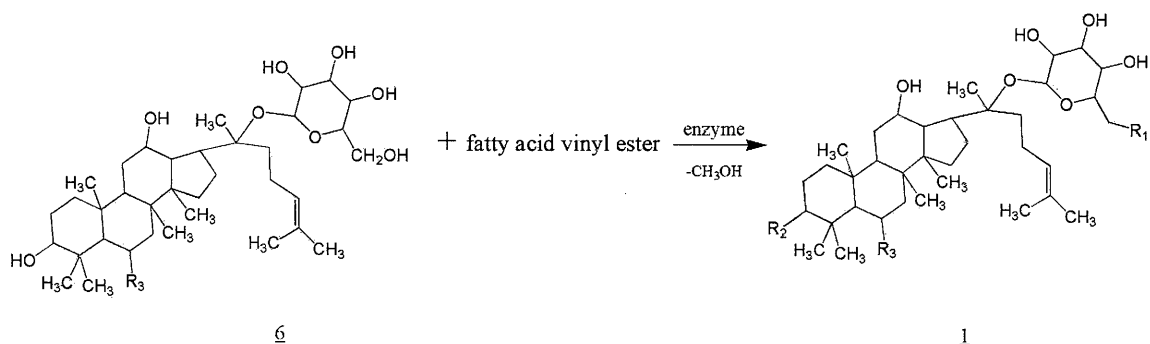
[Formula 5]



【Claim 4】

A method for preparing a ginsenoside fatty acid ester compound of Formula 1, which comprises reacting a compound of Formula 6 and a saturated or unsaturated fatty acid vinyl ester compound of C12 to C22 by an enzyme conversion reaction as represented by the following Reaction Scheme 1:

[Reaction Scheme 1]



wherein R₁ is a saturated or unsaturated fatty acid group of C12 to C22,

R₂ is H or a saturated or unsaturated fatty acid group of C12 to C22 and

R₃ is H or OH.

【Claim 5】

The method for preparing the ginsenoside fatty acid ester compound of claim 4, wherein R₁ is a lauryl group, a tridecyl group, a myristyl group, a pentadecyl group, a palmityl group, a margaryl group, a stearyl group, a nonadecyl group, an arachidyl group, a heneicosyl group, a behenyl group, a palmitoleyl group, an oleyl group, a myristoleyl group, a linoleyl group or an arachidonyl group,

R₂ is OH, a lauryl group, a tridecyl group, a myristyl group, a pentadecyl group, a palmityl group, a margaryl group, a stearyl group, a nonadecyl group, an arachidyl group, a heneicosyl group, a behenyl group, a palmitoleyl group, an oleyl group, a myristoleyl group, a linoleyl group or an arachidonyl group and

R₃ is H or OH.

【Claim 6】

The method for preparing the ginsenoside fatty acid ester compound of claim 4, wherein the enzyme conversion reaction is carried out by using at least one enzyme selected from the group

consisting of *flavourzyme*, *protease A*, *alcalase*, *savinase*, *protamex*, *esperase*, *novozyme*, *esterase* and *acylase*.

【Claim 7】

A cosmetic composition comprising the ginsenoside fatty acid ester compound according to any one of claims 1 to 3 as an active ingredient.