

[Description]

[Title of Invention]

COMPOSITION FOR PROMOTING OF HAIR GROWTH OR HAIR
RESTORATION AND FOR ANTI-INFLAMMATION

[Technical Field]

The present specification discloses a composition for promotion of hair growth or hair restoration and a composition for anti-inflammation.

[Background Art]

As the causes of hair loss, male hormone hyperactivity, excessive secretion of sebum, poor blood circulation, hypofunction of scalp due to peroxides, bacteria, and the like, genetic factors, aging, stress, and the like have been discussed. In addition, the people who suffer from hair loss are gradually increasing by environmental pollution, westernized eating habits such as instant food, frequent perm and dyeing, and the like along with an increase in social stress. The cycle of hair growth can be divided into the anagen stage during which hair grows, the catagen stage during which the growth of hair is ended and the hair bulb shrinks, the telogen stage during which the dermal papilla stops the activity and the hair is preserved on the scalp, and the generation stage during which the dermal papilla begins the activity or the new hair is generated and the old hair is shed.

The anagen stage (2 to 7 years) is the period during which the hair grows and is divided into two phases of a hair growth phase during which the hair begins to emerge from the hair bulb to the trichocyst again and a phase during which the firm keratin is produced in the hair follicle. The hair continues to grow until the catagen stage. The catagen stage (2 to 3 weeks) is a period during which the anagen stage ends and the metabolic process is slowed down while maintaining the shape of the hair, and keratin is not produced at this stage. One percent of all hair is in the catagen stage. At this time, the hair bulb shrinks to be divided into the dermal papilla, the dermal papilla is surrounded by the hair follicle and pushed upward, and cell division is stopped. In the telogen stage (3 months), the dermal papilla shrinks, the hair follicle gradually shrinks, the hair bulb is pushed upward, and the hair is shed. This stage is a period during which the hair is shed, and the span until the next anagen

stage begins is three to four months.

People with normal hair have a large number of hairs in the anagen stage, but people with alopecia have a large number of hairs in the telogen stage resulting in visible hair loss. As hair loss proceeds, the anagen stage is shortened and thus the number of hairs decreases more and more. Hence, in order to treat hair loss, it is important to allow the hair follicle in the telogen stage to rapidly transfer to the anagen stage, and to lengthen the shortened anagen stage.

Male alopecia is caused by testosterone of a male hormone, and when the testosterone is converted into dihydrotestosterone (DHT) of a more powerful hormone by an enzyme called 5 α -reductase, this hormone acts on the hair follicle and leads the hair follicle from the anagen stage to the catagen stage to cause hair loss. Hence, a method to inhibit the production of DHT by 5 α -reductase is mainly used in order to treat male alopecia.

Female alopecia is caused mainly by a decrease in the amount of estrogen after menopause. Minoxidil and estrogen are mainly used as therapeutic agents for female alopecia.

Alopecia areata is caused by autoimmune disease, mental stress, or genetic predisposition. Such alopecia areata is fundamentally different from androgenetic alopecia, and the treatment is also different, so that a method to prescribe corticosteroids is used or a method is used in which minoxidil is applied to the affected area or stimulation is artificially induced to the affected area.

However, in the case of preparations such as minoxidil and trichosaccharide, which have been known to prevent hair loss and have an effect on promotion of hair growth and hair restoration, problems of lack of distinct efficacy, health safety, and side effects such as induction of skin irritation are pointed out, and it is thus urgent to develop a composition having safety and efficacy.

Meanwhile, mediators responsible for inflammation include vaso-active amines, vaso-active polypeptides, and other mediators. The vaso-active amines include histamine and serotonin secreted from mast cells, and these mainly act to enhance vasodilation and permeability. In addition, the vaso-active polypeptides include kinin, plasmin, and complement, and these act as a vasoconstrictor, and lymphocaine such as interleukin-6 (IL-6) and arachidonic acid (arachidonic acid) are responsible for the inflammatory response.

Arachidonic acid produced by the phospholipase activated by physical and chemical stimulations is again metabolized to prostaglandin and leukotriene of inflammatory mediators through two pathways of cyclooxygenase (COX) or lipoxygenase and mediates various inflammatory responses (Thomas, R., Rev. Physiol. Biochem. Pharmacol., 100, 1984, published patent 10-2008-0020853).

The prior art includes Korean Patent No. 10-1274029.

[Summary of Invention]

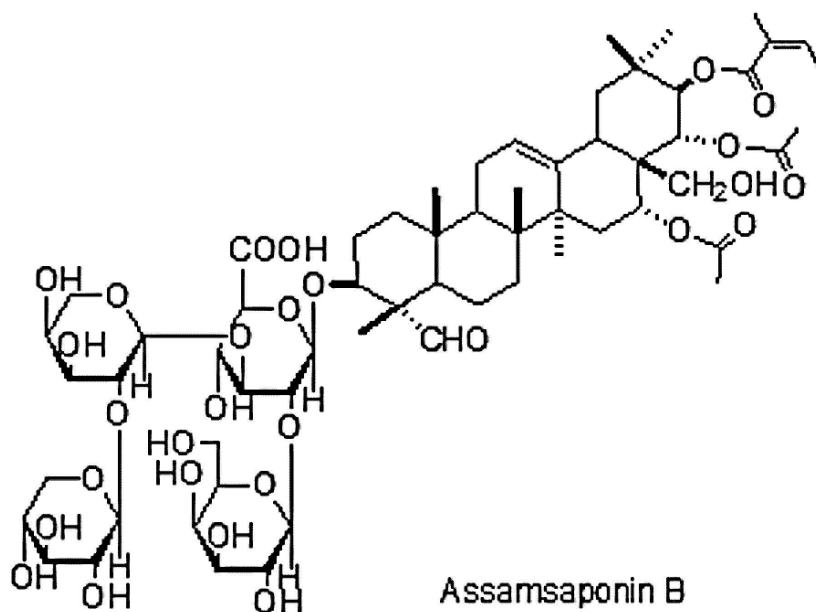
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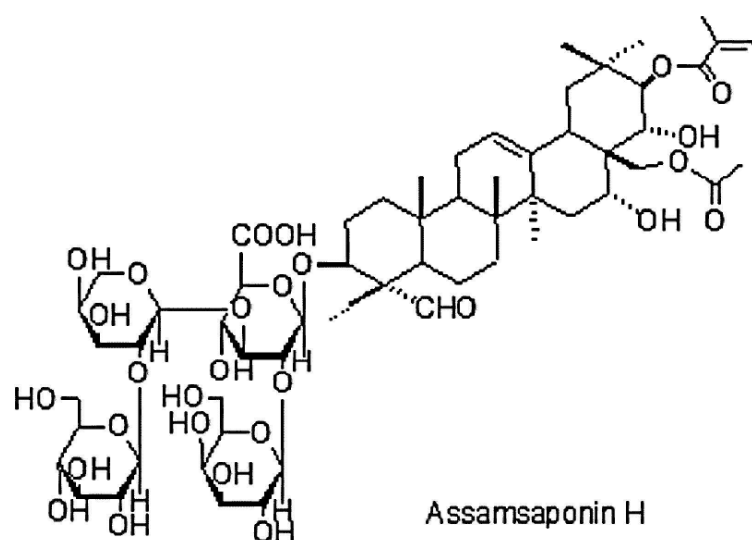
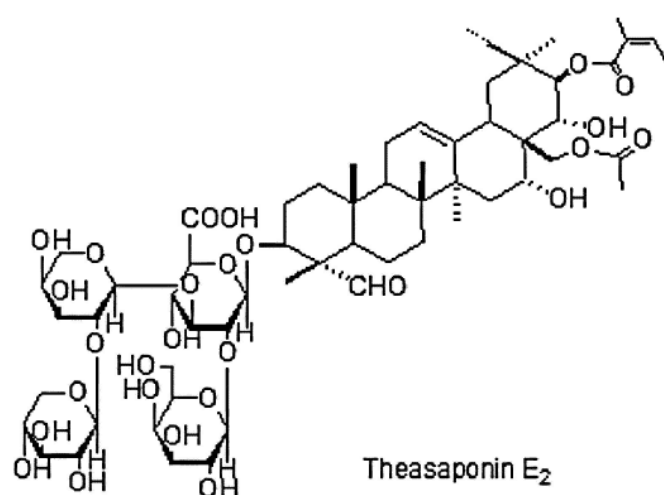
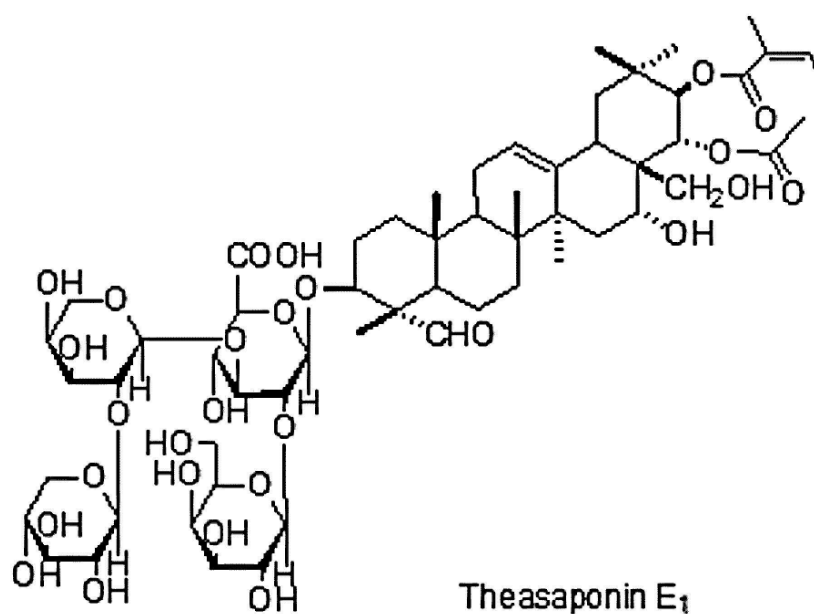
In an aspect, an object of the present specification is to provide a composition for promotion of hair growth or hair restoration containing one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 as an active ingredient.

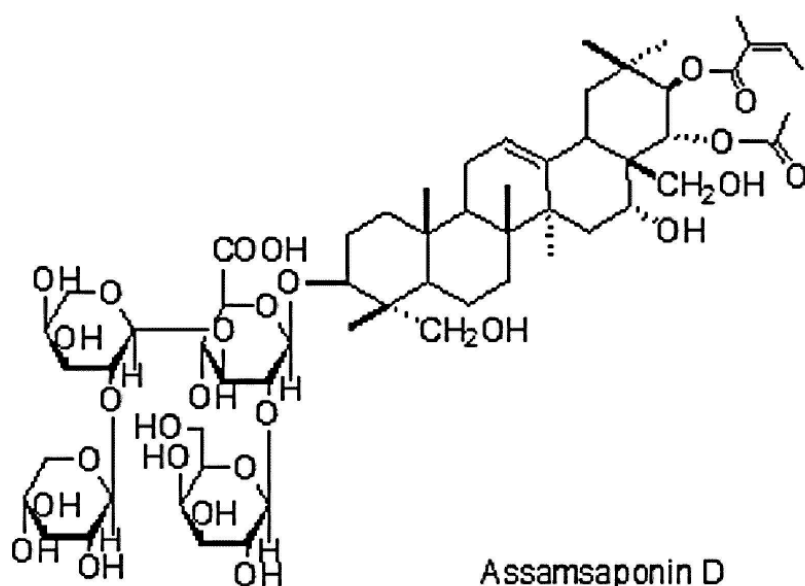
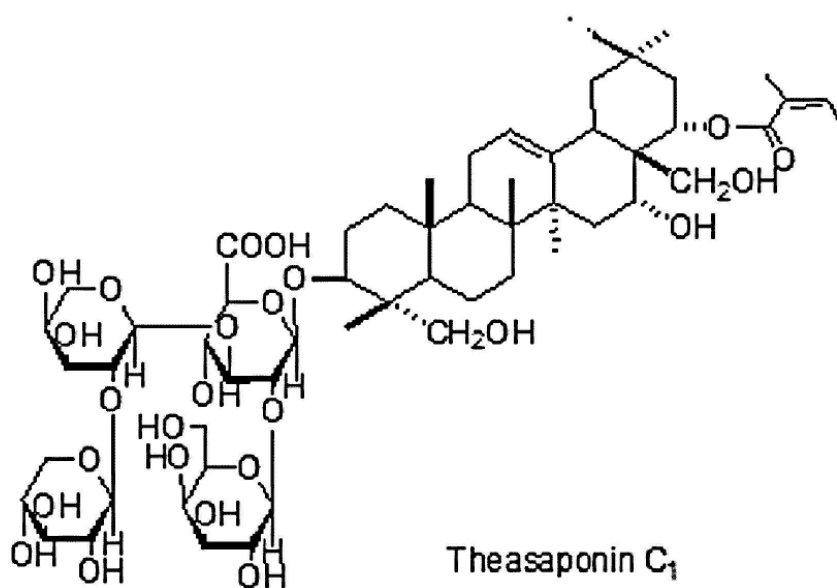
In another aspect, an object of the present specification is to provide a composition for anti-inflammation containing one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 as an active ingredient.

[Solution to Problem]

[Chemical formulas]







In an aspect, the technology disclosed in the present specification provides a composition for promotion of hair growth or hair restoration containing one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which are represented by the above chemical formulas as an active ingredient.

In another aspect, the technology disclosed in the present specification provides a composition for anti-inflammation containing one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which are represented by the above chemical formulas as an active ingredient.

According to an exemplary embodiment, the active ingredient may be

isolated from camellia seed extract.

According to an exemplary embodiment, the composition may proliferate hair follicle dermal papilla cells.

According to an exemplary embodiment, the composition may inhibit production of PGE2, IL-6, or IL-8.

According to an exemplary embodiment, the active ingredient may be contained at from 0.001 to 20% by weight based on a total weight of the composition.

According to an exemplary embodiment, the composition may be a pharmaceutical composition.

According to an exemplary embodiment, the composition may be a cosmetic composition.

According to an exemplary embodiment, the composition may be a food composition.

[Advantageous Effects of Invention]

In an aspect, the technology disclosed in the present specification has an effect of providing a composition for promotion of hair growth or hair restoration containing one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 as an active ingredient.

In another aspect, the technology disclosed in the present specification has an effect of providing a composition for anti-inflammation containing one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 as an active ingredient.

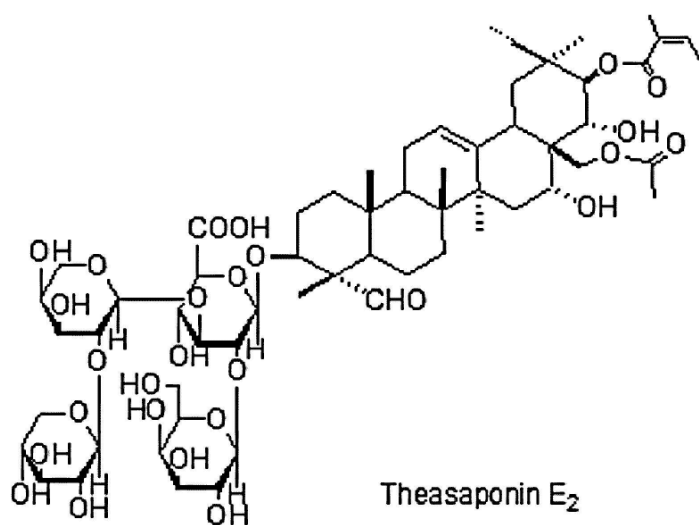
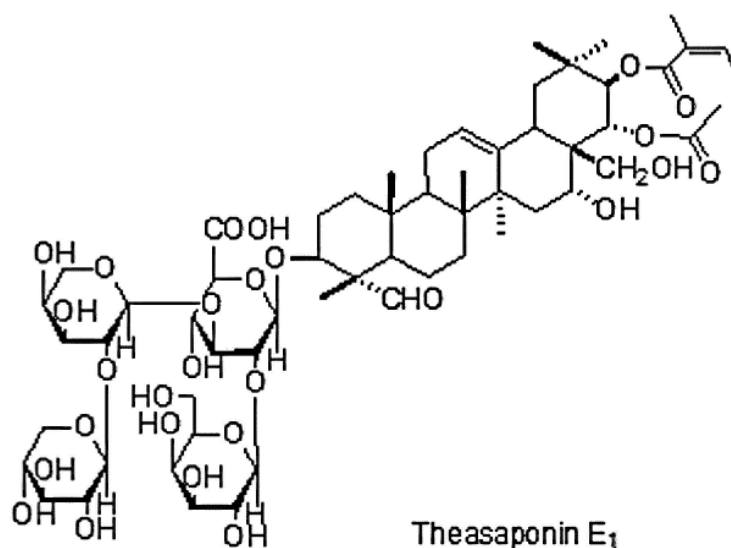
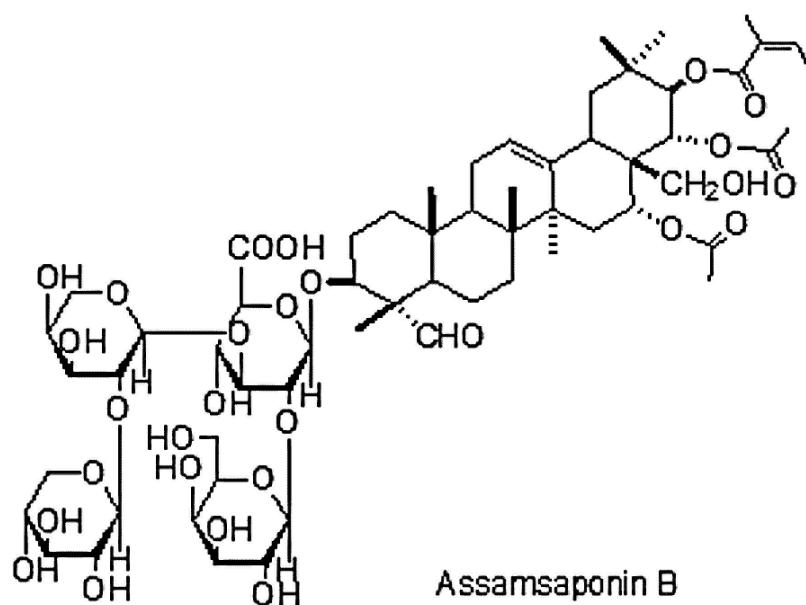
In still another aspect, the technology disclosed in the present specification has an effect of providing pharmaceutical compositions, cosmetic compositions, and food compositions for promotion of hair growth or hair restoration and for anti-inflammation, which contain a natural substance of a plant as an active ingredient and thus do not have side effects but exhibit excellent stability.

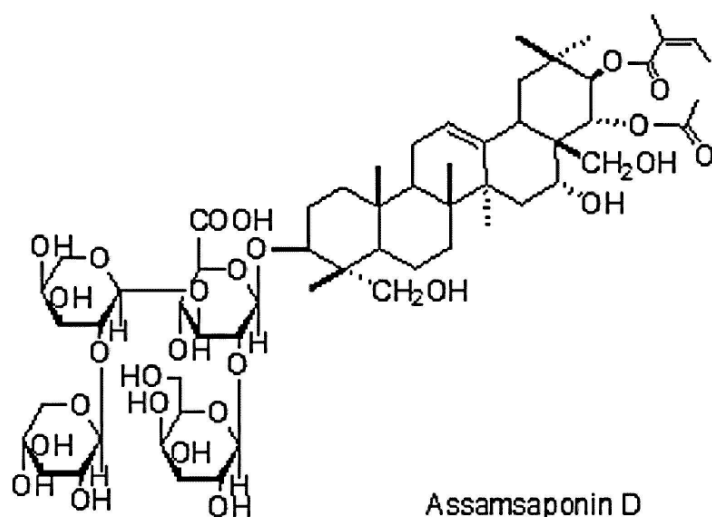
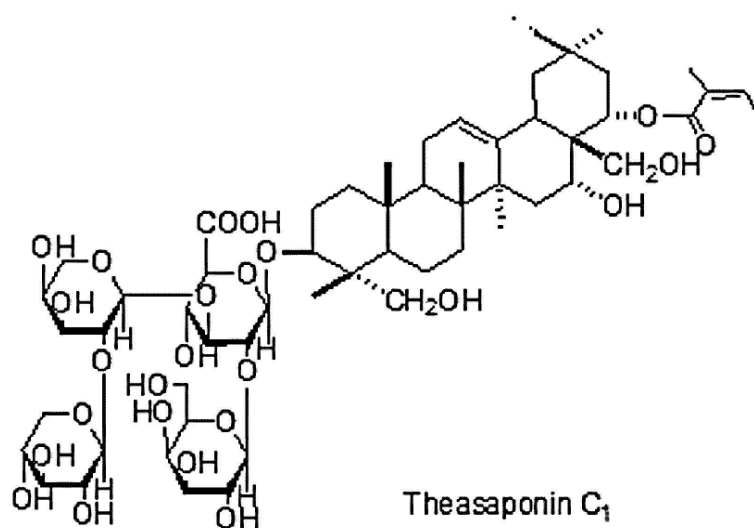
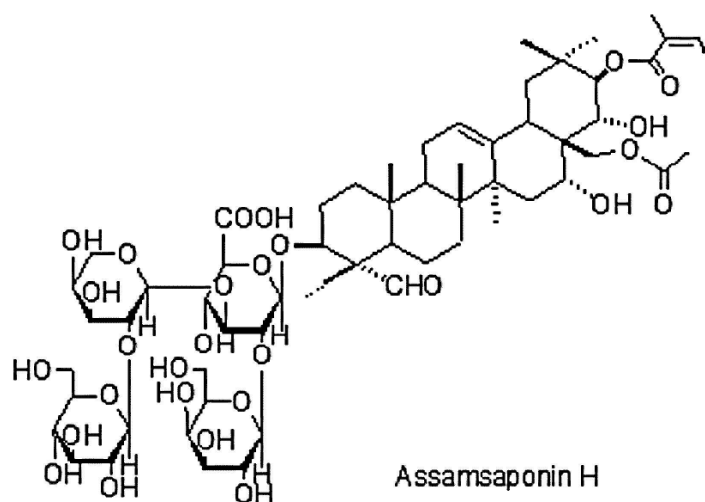
[Description of Embodiments]

Hereinafter, the present invention will be described in detail.

[Embodiments]

[Chemical formulas]





In an aspect, the technology disclosed in the present specification provides a composition for promotion of hair growth or hair restoration containing one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin

E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which are represented by the above chemical formulas as an active ingredient.

In another aspect, the technology disclosed in the present specification provides any one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which are represented by the above chemical formulas for use in the promotion of hair growth or hair restoration.

In still another aspect, the technology disclosed in the present specification provides a method of promoting hair growth or hair restoration, which includes administering one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which are represented by the above chemical formulas or a composition for promotion of hair growth or hair restoration containing these as an active ingredient to a subject in need of hair growth or hair restoration. In an aspect of the present invention, the administration can be performed according to the administration methods and dosages described herein.

In yet another aspect, the technology disclosed in the present specification provides a use of one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which are represented by the above chemical formulas for preparation of a composition for promotion of hair growth or hair restoration.

In addition, in an aspect, the technology disclosed in the present specification provides a composition for anti-inflammation containing one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which are represented by the above chemical formulas as an active ingredient.

In another aspect, the technology disclosed in the present specification provides any one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which are represented by the above chemical formulas for use in anti-inflammation.

In still another aspect, the technology disclosed in the present specification provides a method of relieving inflammation, which includes administering one or more selected from the group consisting of Assamsaponin B, Theasaponin E1,

Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which are represented by the above chemical formulas or a composition for anti-inflammation containing these as an active ingredient to a subject in need of inflammation relief. In an aspect of the present invention, the administration can be performed according to the administration methods and dosages described herein.

In yet another aspect, the technology disclosed in the present specification provides a use of one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which are represented by the above chemical formulas for preparation of a composition for anti-inflammation.

According to an exemplary embodiment, the active ingredient may be isolated from camellia seed extract. Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, or Theasaponin C1 isolated from camellia seed extract can be manufactured by a manufacturing method including a step of obtaining an extract containing saponin from camellia seed by using water or an organic solvent; and a step of isolating Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, or Theasaponin C1 from the extract.

As the step of obtaining an extract containing saponin from camellia seed, one may be appropriately selected from the methods of manufacturing extracts to be used in the art by those skilled in the art and properly adopted, modified, or applied.

According to an exemplary embodiment, as the organic solvent, one or more organic solvents selected from the group consisting of ethanol, methanol, butanol, ether, ethyl acetate, and chloroform or any mixture of these with water may be used, and 50% ethanol may be used in an aspect.

In addition, according to an exemplary embodiment, fractionation using a solvent is followed by concentration under reduced pressure to remove the solvent, thereby obtaining a crude product, and the crude product thus obtained is separated by C18 column chromatography (acetonitrile: water = 8: 1 to 4: 1), thereby obtaining Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, or Theasaponin C1.

According to an exemplary embodiment, the composition may proliferate hair follicle dermal papilla cells. The composition has an effect of activating keratinocytes by proliferating hair follicle dermal papilla cells and promoting hair

growth by enhancing the expression of VEGF of a hair growth factor. In addition, the composition has an effect of promoting hair growth and preventing or improving hair loss by shortening the period of transfer from the telogen stage to the anagen stage in the cycle of hair growth.

According to an exemplary embodiment, the composition may inhibit the production of PGE₂, IL-6, or IL-8.

According to an exemplary embodiment, the active ingredient may be contained at from 0.001 to 20% by weight based on the total weight of the composition. According to another embodiment, the active ingredient may be contained at from 0.01 to 15% by weight, from 0.01 to 10% by weight, or from 0.1 to 5% by weight based on the total weight of the composition.

In an aspect, the active ingredient contained in the compositions disclosed herein may be contained at 0.001% by weight or more, 0.01% by weight or more, 0.1% by weight or more, or 1.0% by weight or more based on the total weight of the composition, and in another aspect, the active ingredient may be contained at 20% by weight or less, 15% by weight or less, 10% by weight or less, or 5% by weight or less. The content of the active ingredient is not particularly limited to the above content, but the composition has excellent hair growth, hair restoration, and anti-inflammatory effects as the content is 0.001% by weight or more, and the composition exhibits safety, is easily manufactured in terms of formulation, and can exhibit excellent efficacy without side effects as the content is 20% by weight or less.

According to an exemplary embodiment, the composition may be a pharmaceutical composition.

The pharmaceutical composition may additionally contain pharmaceutical adjuvants such as a preservative, a stabilizer, a wetting or emulsifying agent, and a salt and/or a buffer for the control of osmotic pressure and other therapeutically useful substances in addition to the active ingredient disclosed herein, and it may be formulated into various forms of oral or parenteral administration agents by conventional methods.

Examples of the oral administration agent may include tablets, pills, hard and soft capsules, liquids, suspensions, emulsions, syrups, powders, powder remedies, infinitesimal grains, granules, and pellets. These formulations may contain a surfactant, a diluent (for example, lactose, dextrose, sucrose, mannitol, sorbitol, cellulose, and glycine), and a lubricant (for example, silica, talc, stearic acid and

magnesium or calcium salt thereof, and polyethylene glycol) in addition to the active ingredient. Tablets may also contain a binder such as magnesium aluminum silicate, starch paste, gelatin, tragacanth, methylcellulose, sodium carboxymethylcellulose, or polyvinylpyrrolidone. Tablets may optionally contain pharmaceutical additives such as starch, agar, a disintegrant such as alginic acid or sodium salt thereof, an absorbent, a colorant, a flavoring agent, and a sweetening agent. The tablets may be manufactured by conventional mixing, granulating, or coating methods.

In addition, the parenteral administration form may be a transdermal administration form, and for example, the parenteral administration form may be formulations such as injections, drops, ointments, lotions, gels, creams, sprays, suspensions, emulsions, suppositories, and patches, but it is not limited thereto.

The pharmaceutical composition may be administered by a parenteral form, a rectal form, a topical form, a transdermal form, a subcutaneous form, and the like. The pharmaceutical composition according to an embodiment of the present invention may be topically administered, for example, to the scalp.

The dosage of the active ingredient is determined by those skilled in the art, and the daily dose of the drug depends on various factors such as the degree of progress, time of onset, age, health condition, complications, and the like of the subject to be administered. The composition may be administered in an amount of 1 $\mu\text{g/kg}$ to 200 mg/kg in an aspect and 50 $\mu\text{g/kg}$ to 50 mg/kg in another aspect from one to three times a day when it is administered to an adult. The dosage is not intended to limit the scope of the present invention in any way.

The pharmaceutical composition may be an external preparation for skin, and the external preparation for skin is a generic term that may include any preparation to be applied from the outside of the skin, and medicines of various formulations may be included therein.

According to an exemplary embodiment, the composition may be a cosmetic composition.

The cosmetic composition may additionally contain functional additives and components to be contained in a general cosmetic composition in addition to the active ingredient disclosed herein. The functional additives may include components selected from the group consisting of water-soluble vitamins, oil-soluble vitamins, polymer peptides, polymeric polysaccharides, sphingolipids, and seaweed

extracts. Examples of components to be additionally blended other than these may include oil and fat components, a moisturizer, an emollient, a surfactant, organic and inorganic pigments, an organic powder, an ultraviolet absorber, a preservative, a bactericide, an antioxidant, a plant extract, a pH adjusting agent, an alcohol, a colorant, a perfume, a blood circulation accelerator, a coolant, an antiperspirant, and purified water.

The formulation of the cosmetic composition is not particularly limited and may be appropriately selected depending on the purpose. For example, the cosmetic composition may be manufactured into any one or more formulations selected from the group consisting of a skin lotion, a skin softener, a skin toner, an astringent, a lotion, a milky lotion, a moisturizing lotion, a nourishing lotion, a massage cream, a nourishing cream, a hand cream, a foundation, an essence, a nourishing essence, a pack, a soap, a cleansing foam, a cleansing lotion, a cleansing cream, a body lotion, and a body cleanser, but it is not limited thereto.

In a case in which the formulation of the present invention is a paste, a cream, or a gel, an animal fiber, a plant fiber, wax, paraffin, starch, tragacanth, a cellulose derivative, polyethylene glycol, silicone, bentonite, silica, talc, or zinc oxide may be used as a carrier component.

In a case in which the formulation of the present invention is a powder or a spray, lactose, talc, silica, aluminum hydroxide, calcium silicate, or polyamide powder may be used as a carrier component. Particularly in the case of a spray, a propellant such as chlorofluorohydrocarbons, propane/butane, or dimethyl ether may be additionally contained.

In a case in which the formulation of the present invention is a solution or an emulsion, a solvent, a dissolvent, or an emulsifier is used as a carrier component. Examples thereof may include water, ethanol, isopropanol, ethyl carbonate, ethyl acetate, benzyl alcohol, benzyl benzoate, propylene glycol, 1,3-butyl glycol oil, glycerol aliphatic esters, polyethylene glycol, or sorbitan fatty acid esters.

In a case in which the formulation of the present invention is a suspension, a liquid diluent such as water, ethanol, or propylene glycol, a suspending agent such as ethoxylated isostearyl alcohol, polyoxyethylene sorbitol ester, or polyoxyethylene sorbitan ester, microcrystalline cellulose, aluminum metahydroxide, bentonite, agar, tragacanth, or the like may be used as a carrier component.

In a case in which the formulation of the present invention is a surfactant-

containing cleansing, an aliphatic alcohol sulfate, an aliphatic alcohol ether sulfate, a sulfosuccinic acid monoester, an isethionate, an imidazolinium derivative, a methyltaurate, a sarcosinate, a fatty acid amide ether sulfate, an alkylamidobetaine, an aliphatic alcohol, a fatty acid glyceride, a fatty acid diethanolamide, a vegetable oil, a linolenic derivative, or an ethoxylated glycerol fatty acid ester may be used as a carrier component.

According to an exemplary embodiment, the composition may be a food composition.

The food composition may be a formulation in a liquid or solid state. Examples thereof may include various foods, beverages, gums, tea, vitamin complexes, and health supplement foods. The food composition may be used in the form of powders, granules, tablets, capsules, or beverages. Components commonly used in the field may be appropriately selected and blended in the food composition of each formulation in addition to the active ingredient described herein by those skilled in the art depending on the formulation or the purpose of use without difficulty. A synergistic effect can be obtained when the food composition is simultaneously applied with other raw materials.

There are no particular limitations on the liquid components that can be contained in addition to the active ingredient disclosed herein, and various flavoring agents or natural carbohydrates may be contained as additional components as in ordinary beverages. Examples of the natural carbohydrate may include saccharides such as monosaccharides, disaccharides such as glucose and fructose, polysaccharides such as maltose and sucrose, dextrin, and cyclodextrin and sugar alcohols such as xylitol, sorbitol, and erythritol. As the flavoring agent, natural flavoring agents (thaumatin, stevia extract (for example, rebaudioside A or glycyrrhizin) and synthetic flavoring agents (for example, saccharin and aspartame) may be advantageously used. The ratio of the natural carbohydrate may be about from 1 to 20 g in general and about from 5 to 12 g in an aspect per 100 ml of the composition disclosed herein.

In an aspect, the food composition may contain various nutrients, vitamins, minerals (electrolytes), flavoring agents such as synthetic flavoring agents and natural flavoring agents, a colorant and an enhancer (cheese, chocolate, or the like), pectic acid and any salt thereof, alginic acid and any salt thereof, an organic acid, a protective colloid thickener, a pH adjusting agent, a stabilizer, a preservative, glycerin, an alcohol, and a carbonating agent used in carbonated beverages. In another aspect,

the food composition may contain flesh for the production of natural fruit juice and vegetable beverages. These components may be used independently or in combination. The ratio of the additives may be various, but it is general that the additives are selected in the range of from 0.001 to about 20 parts by weight per 100 parts by weight of the composition disclosed herein.

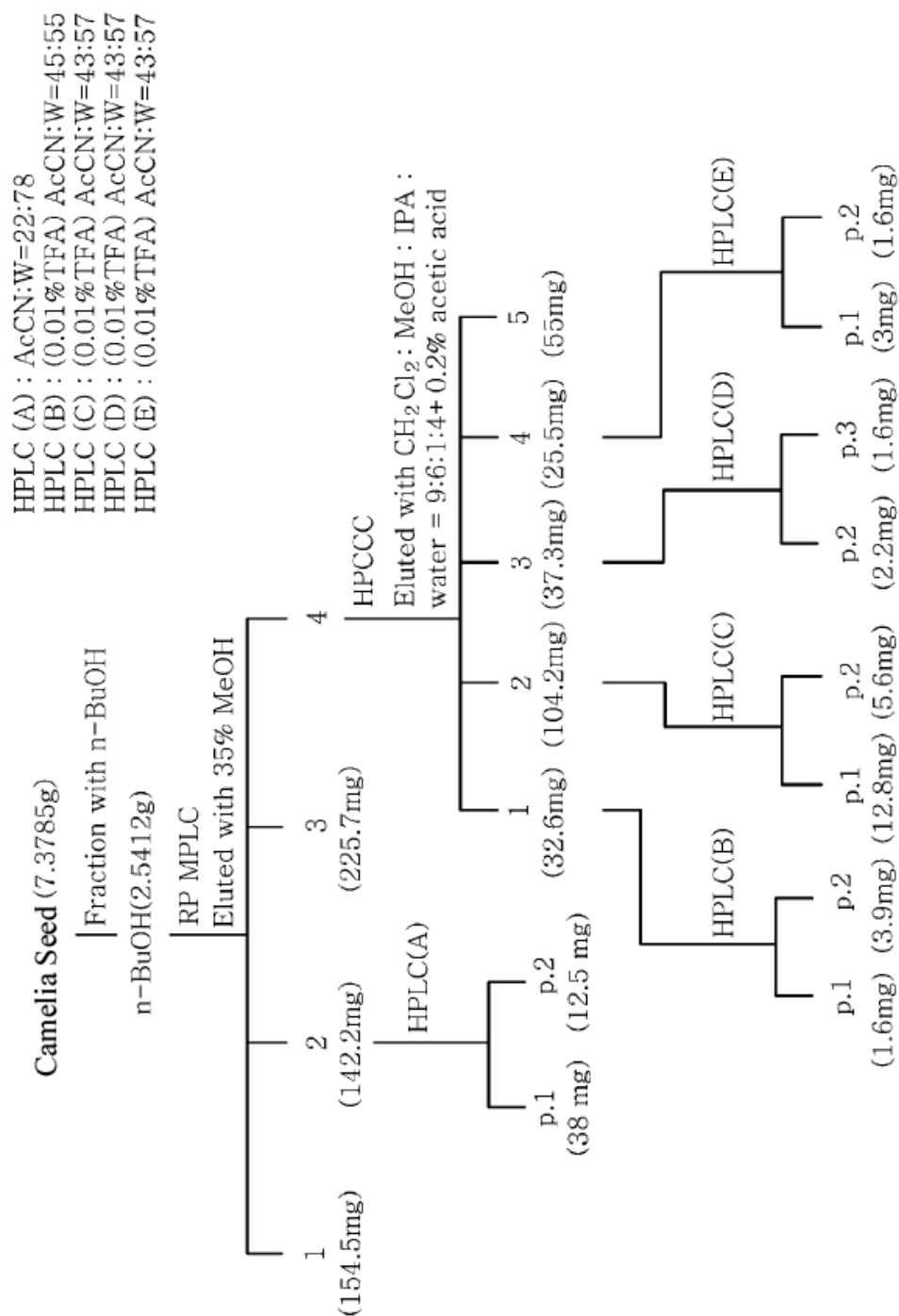
[Examples]

Hereinafter, the present invention will be described in more detail with reference to Examples. These Examples are for illustrating the present invention only, and it will be apparent to those skilled in the art that the scope of the present invention is not construed as being limited by these Examples.

Preparation Example 1. Preparation of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1

To 1 kg of camellia seed, 3 L of hexane was added, and the mixture was stirred at room temperature for degreasing. Thereafter, 4 L of 50% ethanol was added to 0.5 kg of the degreased camellia seed, the mixture was refluxed three times for extraction and then immersed at 15°C for one day. Thereafter, the residue and the filtrate were separated by filtration through a filter cloth and centrifugation, and the separated filtrate was concentrated under reduced pressure, thereby preparing camellia seed extract.

In addition, 7.37 g of the camellia seed extract thus prepared was suspended in water and fractionated with n-BuOH, and 1.40 g of BuOH-soluble fraction in 2.54 g of the BuOH-soluble fraction thus obtained was purified by RP MPLC using 35% MeOH as an eluent. In the fraction, the B4 subfraction was subjected to HPLC under the condition using CMIW = 9: 6: 1: 4 (+ 0.2% acetic acid) as an eluent. The subfractions B41, B42, B43, and B44 thus obtained were purified by HPLC conditions, respectively, and as a result, eight kinds of substances of B41p1 (1.6mg), B41p2 (Assamsaponin B, 3.9mg), B42p1 (Theasaponin E1, 12.8mg), B42p2 (Theasaponin E2, 5.6mg), B43p2 (Assamsaponin H, 2.2mg), B43p3 (Camelliasaponin B1, 1.6mg), B44p1 (Assamsaponin D, 3 mg), and B44p2 (Theasaponin C1, 1.6 mg) were obtained in total (see the following scheme).



Test Example 1. Increase of Expression of VEGF of Hair Growth Factor in Dermal Papilla Cell

In order to evaluate the degree to which Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 express the vascular endothelial growth factor (VEGF) of a growth factor required to transfer to the anagen stage as a growth factor for vascularization, the efficacy of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin

D, and Theasaponin C1 which were derived from camellia saponin was evaluated by adopting the in vitro system.

For this experiment, 4×10^5 cells of dermal papilla cell (DPC) (P.11) in a 47 year-old male were seeded in a 12-well plate and incubated in DMEM (Dulbecco's modified Eagle's medium) containing 10% FBS (fetal bovine serum) for the night. After the incubation, the incubated cells were treated with 20 ppm of each of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which were derived from camellia saponin. Theasaponin was used as Comparative Example and DMSO was used as a negative control group.

After 24 hours, the soup treated with Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which were derived from camellia saponin was collected and the degree of expression of VEGF was confirmed by using a VEGF ELISA (Vascular Endothelial Growth Factor Enzyme-Linked Immunosorbent Assay; R&D biosystems). The results are presented in the following Table 1.

[Table 1]

Sample	VEGF in culture media (ng/ml)
Assamsaponin B	17
Theasaponin E1	15
Theasaponin E2	19
Assamsaponin H	12
Assamsaponin D	12
Theasaponin C1	15
Comparative Example (Theasaponin)	9
Control group	5

As can be seen from Table 1, Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 have a significant difference in the effect as compared to Comparative Example and the control group. Specifically, the expression of VEGF of a hair growth factor in the dermal papilla cells has increased by three-fold or more. Consequently, it can be seen that Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 have excellent hair growth promoting ability.

Test Example 2. Proliferation of Hair Follicle Dermal Papilla Cell

The keratin proteins constituting the hair are produced in the keratinocytes in the hair root portion, and the keratinocytes are differentiated from the dermal papilla cells. Hence, if Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 promote the activity of the dermal papilla cells, the activity of the keratinocytes differentiated therefrom can be promoted and further the generation of hair can be promoted. Accordingly, the effect of promoting the activity of dermal papilla cells by Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 was evaluated as follows.

First, in this Test Example, the experiment was conducted by using a cell line of human dermal papilla cell (hDPC, obtained from Professor Oh Sang Kwon of Seoul National University). The cell line was incubated in Dulbecco's modified Eagle's medium (DMEM; Gibco BRL, Gaithersburg, MD, USA) containing 10% fetal bovine serum (FBS) in an incubator maintained at 5% CO₂ and 37°C for 24 hours and then treated with 20 ppm of each of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which were derived from camellia saponin. Theasaponin was used as Comparative Example and DMSO was used as a negative control group.

The cell proliferating ability (%) was measured by using WST-1 kit (Roche) after 24 hours from the treatment of the cells with the test substance, and the results are presented in Table 2.

[Table 2]

Sample	hDPC Proliferation (ng/ml)
Assamsaponin B	153
Theasaponin E1	132
Theasaponin E2	135
Assamsaponin H	159
Assamsaponin D	147
Theasaponin C1	128
Comparative Example (Theasaponin)	116
Control group	100

As can be seen from Table 2, a rate of increase in proliferation of dermal papilla cells was higher in the case of being treated with Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 by 1.5-fold those in the case of being treated with Comparative

Example and the control group. This means that Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 can promote the proliferation of dermal papilla cells and also can more effectively promote the activity of keratinocytes and hair growth.

Test Example 3. Promotion of Hair Growth in Human Hair Follicle Organ

In this Test Example, the hair growth promoting ability in the human hair follicle organ was confirmed.

The hair follicle organs were separated from the scalp tissue in the occipital region of a 55 year-old male one by one and incubated in William's E medium (containing L-glutamine (2 mM), insulin (10 µg/ml), hydrocortisone (40 ng/ml), antibiotic (1%), and antifungal agent (1%)). The hair follicles grown were selected and cut into 3 mm on the third day after start of the incubation, the hair follicles selected which were not treated with an agent are used as a control group, but the hair follicles selected were treated with each of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which were derived from camellia saponin, and the hair follicles selected which were treated with Theasaponin are used as Comparative Example. After 8 days from the treatment, the length of hair was measured and the photograph of hair was taken, respectively. The results are presented in Table 3.

[Table 3]

Sample	Average growth length (mm)
Assamsaponin B	2.03
Theasaponin E1	1.85
Theasaponin E2	1.88
Assamsaponin H	1.98
Assamsaponin D	2.11
Theasaponin C1	1.69
Comparative Example (Theasaponin)	1.63
Control group	1.56

As a result, as can be seen from Table 3, in the increase of the hair length in the hair follicle organ, a superior hair growth promoting effect was exhibited in the case of being treated with Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 as compared to Comparative

Example and the control group. Consequently, it can be seen that Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 have an excellent effect of promoting hair growth in hair follicles.

Test Example 4. Inhibition of Production of PGE2, IL-6, and IL-8

Human fibroblasts were inoculated into a 6-well culture plate at a concentration of 1×10^5 cells and incubated in an incubator at 37°C and 5% CO₂ for 24 hours. The wells were treated with 500 μ M H₂O₂ and stimulated for 24 hours, and the cells were then treated with Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1, and with Theasaponin as Comparative Example, and allowed to react with the test substance for 48 hours. After the reaction was completed, the culture media were collected and subjected to ELISA analysis. At this time, α -bisabolol which is a substance to be often used as an anti-inflammatory agent and an abirritant was used as a control group.

A kit manufactured by Assay Design was used for PGE2 and a kit manufactured by Endogen was used for IL-6 and IL-8, and the test was conducted according to the method described in the manual of each company. The inhibiting effect was calculated according to the following mathematical formula (1), and the measurement results are presented in the following Table 4.

[Math. 1]

$$\text{Inhibiting effect} = \{1 - (\text{test sample} - \text{control group}) / (\text{H}_2\text{O}_2 - \text{control group})\} \times 100$$

[Table 4]

Sample (100 μ g/ml)	Production inhibiting effect (pg/ml)		
	PGE	IL-6	IL-8
Assamsaponin B	192	170	210
Theasaponin E1	232	185	248
Theasaponin E2	205	192	233
Assamsaponin H	189	168	212
Assamsaponin D	196	174	209
Theasaponin C1	214	188	247
Comparative Example (Theasaponin)	255	199	256
H ₂ O ₂ (500 μ M)	355	250	285
Control group	271	207	269

As presented in Table 4 above, the amounts of PGE2, IL-6, and IL-8, which are inflammatory mediators, have remarkably decreased by the addition of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 as compared to Comparative Example and the control group, and it has been thus confirmed that Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 have an excellent anti-inflammatory effect.

Formulation Examples of the composition according to an aspect of the present invention are described below, but the composition may be applied to various other formulations, and it is not intended to limit the present invention but only to illustrate the present invention.

[Formulation Example 1] Shampoo

Shampoo was prepared by a conventional method so as to have the composition presented in the following Table 5.

[Table 5]

Component	Content (% by weight)
One or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1	2.00
Sodium lauryl sulfate	10.00
Cocamidopropyl betaine	3.00
Carboxyl vinyl polymer	0.30
Polyquaternium-10	0.20
Cetyltrimethylammonium chloride	0.10
Purified water	Balance
Sum	100.00

[Formulation Example 2] Rinse

Rinse was prepared by a conventional method so as to have the composition presented in the following Table 6.

[Table 6]

Component	Content (% by weight)
One or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1	2.00

Cetyl alcohol	2.00
Stearyl alcohol	2.50
Behenyl alcohol	0.50
Silicone emulsion	0.40
Cyclomethicone	1.00
Dimethyldistearylammonium chloride	0.10
Purified water	Balance
Sum	100.00

[Formulation Example 3] Ointment

Ointment was prepared by a conventional method so as to have the composition presented in the following Table 7.

[Table 7]

Component	Content (% by weight)
One or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1	2.00
Glycerin	8.00
Butylene glycol	4.00
Liquid paraffin	15.00
β -Glucan	7.00
Carbomer	0.10
Caprylic/Capric triglyceride	3.00
Squalane	1.00
Cetearyl glucoside	1.50
Sorbitan stearate	0.40
Cetearyl alcohol	1.00
Beeswax	4.00
Purified water	Balance
Sum	100.00

[Formulation Example 4] Hair Tonic

A hair tonic was prepared by a conventional method so as to have the composition presented in the following Table 8.

[Table 8]

Component	Content (% by weight)
Ethanol	55.00

Castor oil	5.00
Glycerin	3.00
Piroctone olamine	0.10
One or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1	1.00
Perfume and colorant	Proper amounts
Purified water	Balance
Sum	100.00

[Formulation Example 5] Hair Lotion

Hair lotion was prepared by a conventional method so as to have the composition presented in the following Table 9.

[Table 9]

Component	Content (% by weight)
Cetostearyl alcohol	2.00
Stearyltriethylammonium chloride	2.00
Hydroxyethylcellulose	0.50
Piroctone olamine	0.10
One or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1	10.00
Perfume and colorant	0.50
Purified water	Balance
Sum	100.00

[Formulation Example 6] Soap

Soap was prepared by a conventional method so as to have the composition presented in the following Table 10.

[Table 10]

Component	Content (% by weight)
One or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1	5.00
Titanium dioxide	0.20
Polyethylene glycol	0.80
Glycerin	0.50

Ethylenediamine tetraacetic acid	0.05
Sodium	1.00
Colorant	Proper amount
Soap incense	Proper amount
Soap base (moisture content: 13%, parts by weight)	To 100
Sum	100.00

[Formulation Example 7] Lotion

Lotion was prepared by a conventional method so as to have the composition presented in the following Table 11.

[Table 11]

Component	Content (% by weight)
One or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1	2.00
L-ascorbic acid-2-phosphate magnesium salt	1.00
Water-soluble collagen (1% aqueous solution)	1.00
Sodium citrate	0.10
Citric acid	0.05
Licorice extract	0.20
1,3-Butylene glycol	3.00
Purified water	Balance
Sum	100.00

[Formulation Example 8] Cream

Cream was prepared by a conventional method so as to have the composition presented in the following Table 12.

[Table 12]

Component	Content (% by weight)
One or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1	2.00
Polyethylene glycol monostearate	2.00
Self-emulsifying monostearate glycerin	5.00
Cetyl alcohol	4.00
Squalene	6.00
Tri-2-ethylhexane glyceryl	6.00

Sphingoglycolipids	1.00
1-3-Butylene glycol	7.00
Purified water	Balance
Sum	100.00

[Formulation Example 9] Pack

Pack was prepared by a conventional method so as to have the composition presented in the following Table 13.

[Table 13]

Component	Content (% by weight)
One or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1	2.00
Polyvinyl alcohol	13.00
L-ascorbic acid-2-phosphate magnesium salt	1.00
Lauroylhydroxyproline	1.00
Water-soluble collagen (1% aqueous solution)	2.00
1,3-Butylene glycol	3.00
Ethanol	5.00
Purified water	Balance
Sum	100.00

[Formulation Example 10] Cosmetic liquid preparation

A cosmetic liquid preparation was prepared by a conventional method so as to have the composition presented in the following Table 14.

[Table 14]

Component	Content (% by weight)
One or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1	2.00
Hydroxyethylene cellulose (2% aqueous solution)	12.00
Xanthan gum (2% aqueous solution)	2.00
1,3-Butylene glycol	6.00
Concentrated glycerin	4.00
Sodium hyaluronate (1% aqueous solution) 5.00	5.00
Purified water	Balance
Sum	100.00

[Formulation Example 11] Soft Capsule

With 50 mg of one or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1, 80 to 140 mg of L-carnitine, 180 mg of soybean oil, 2 mg of palm oil, 8 mg of hydrogenated vegetable oil, 4 mg of yellow wax, and 6 mg of lecithin were mixed, and the mixture was filled in a capsule by 400 mg per one capsule by a conventional method, thereby preparing a soft capsule.

[Formulation Example 12] Tablet

With 50 mg of one or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1, 200 mg of galactooligosaccharide, 60 mg of lactose, and 140 mg of maltose were mixed, the mixture was granulated by using a fluidized bed drier, 6 mg of sugar ester was added to the granule, and the mixture was formed into a tablet by using a tableting machine.

[Formulation Example 13] Granule

With 50 mg of one or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1, 250 mg of anhydrous crystalline glucose and 550 mg of starch were mixed, the mixture was formed into granules by using a fluidized bed granulator, and the granules were filled in a pouch, thereby preparing granules.

[Formulation Example 14] Health Drink

With 50 mg of one or more compounds selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1, 10 g of glucose, 0.6 g of citric acid, and 25 g of liquid oligosaccharide were mixed, 300 ml of purified water was added to the mixture, and the mixture thus obtained was filled in a bottle by 200 ml per one bottle. Thereafter, the bottled drink was sterilized at 130°C for 4 to 5 seconds, thereby preparing a health drink beverage.

While the present invention has been described with respect to the specific embodiments, it will be apparent to those skilled in the art that the above embodiments are not limiting but illustrative and that the scope of the present

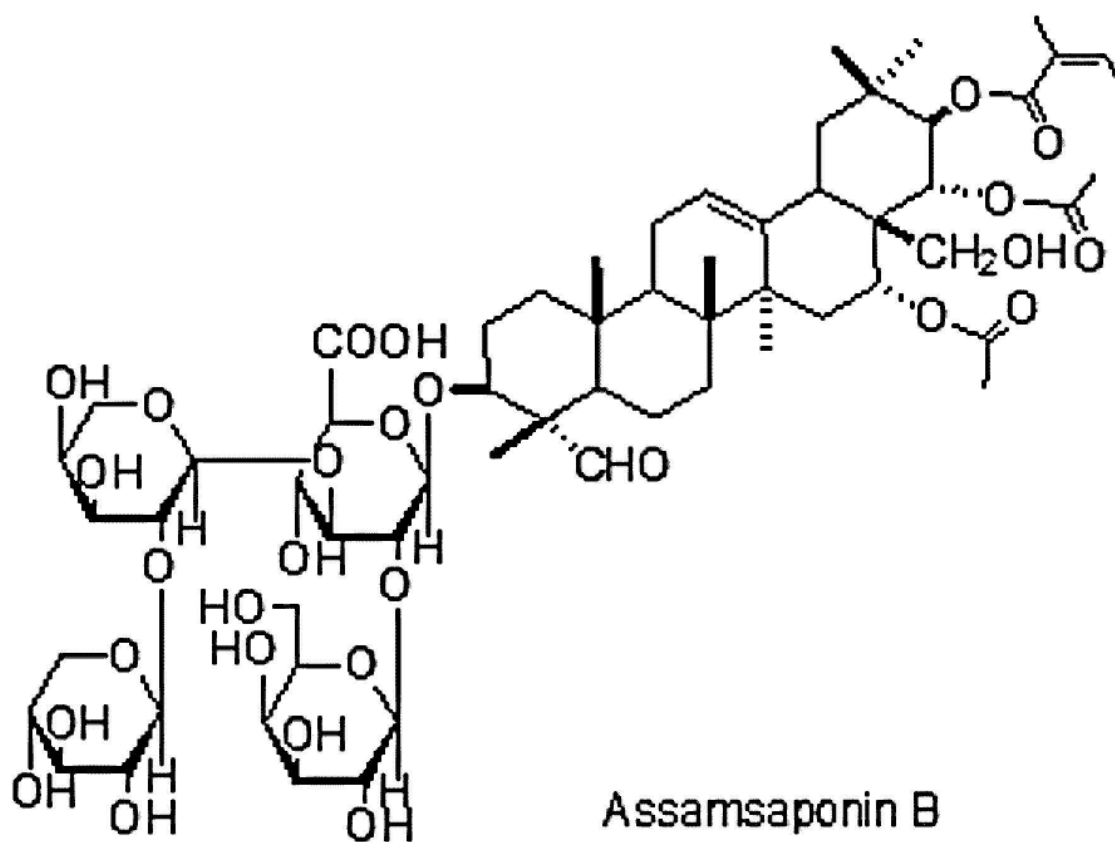
invention is not limited thereby. Therefore, it should be understood that the actual scope of the present invention will be defined by the appended claims and their equivalents.

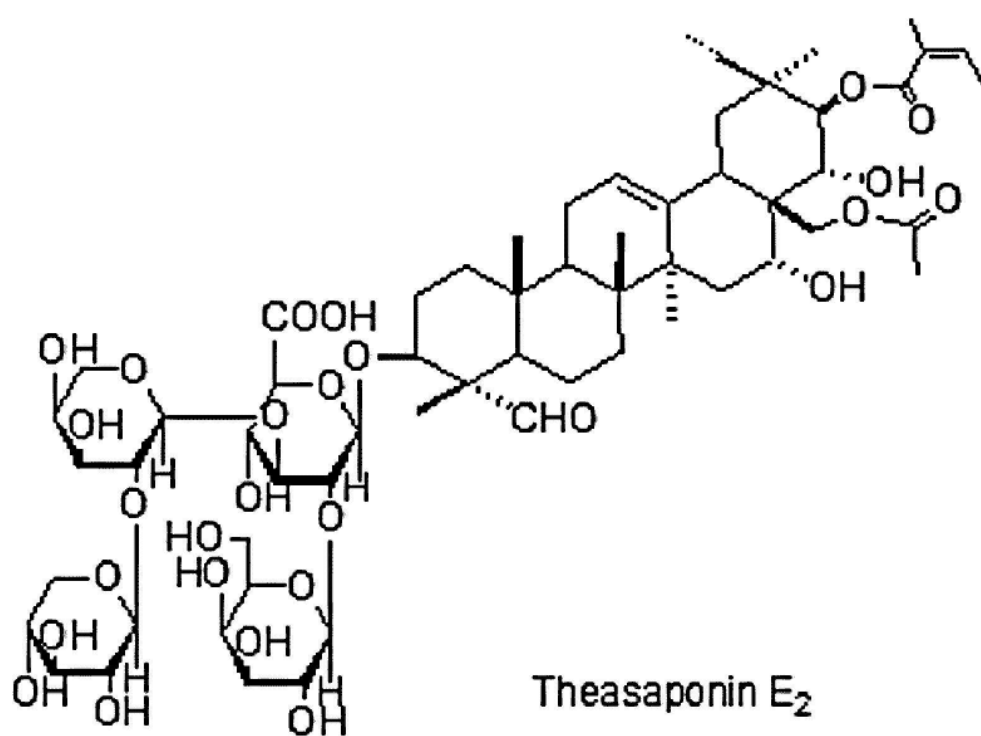
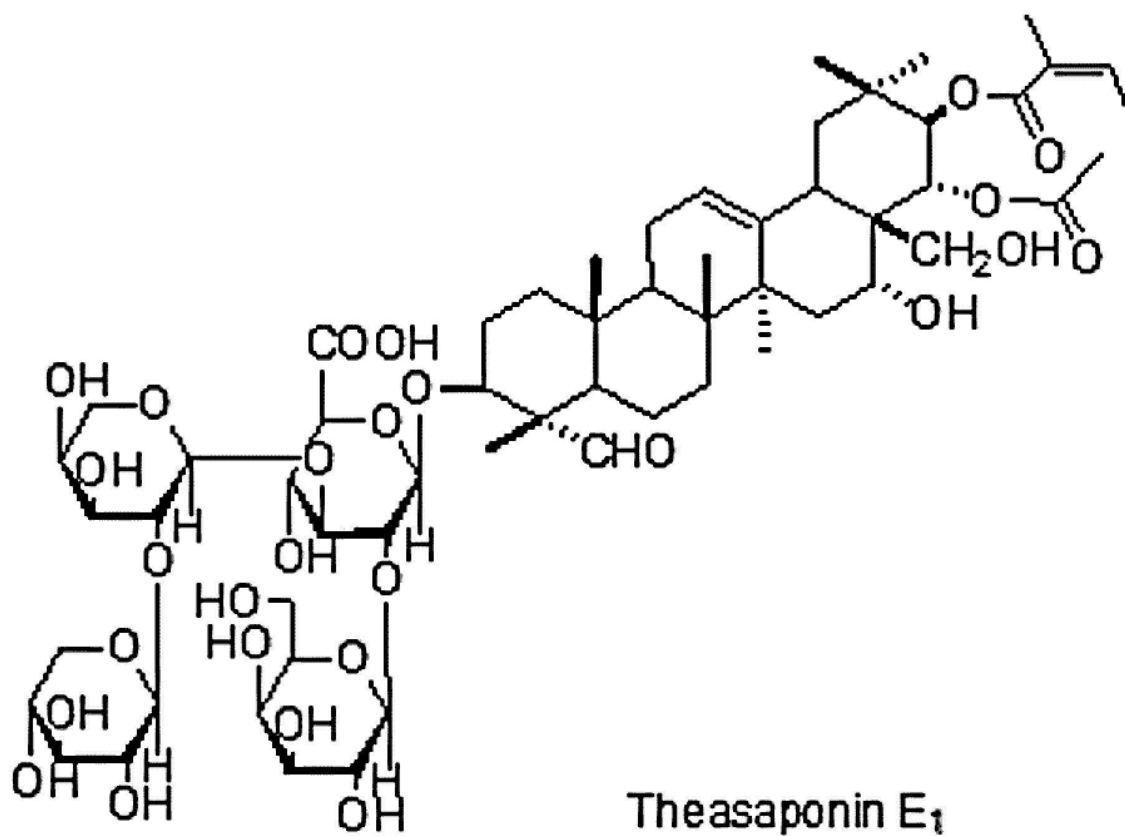
[Claims]

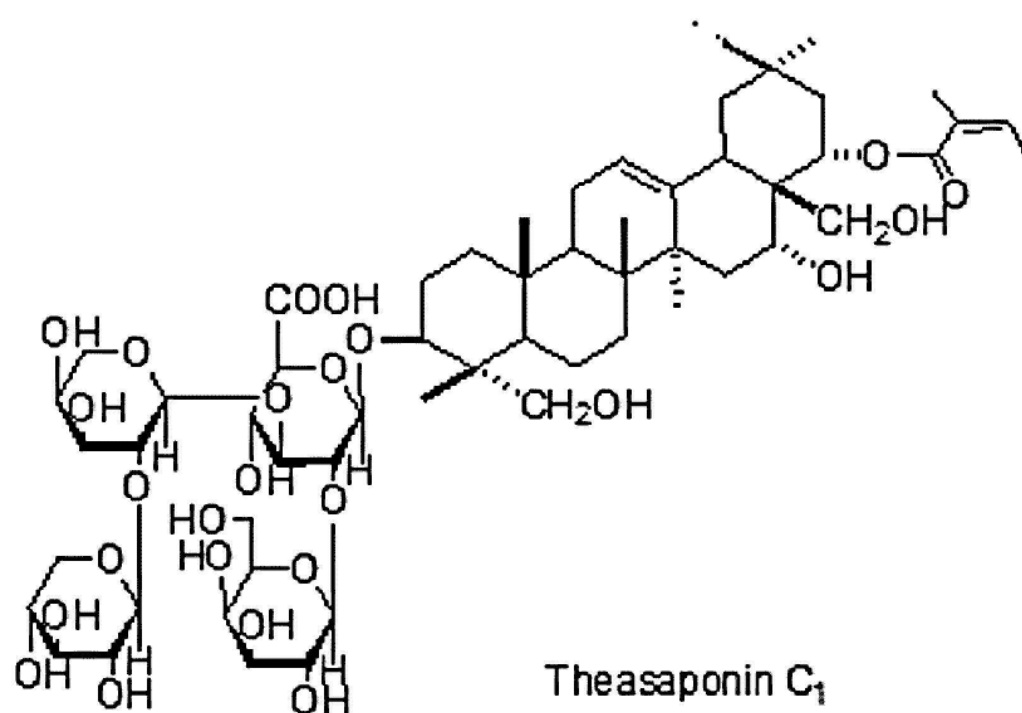
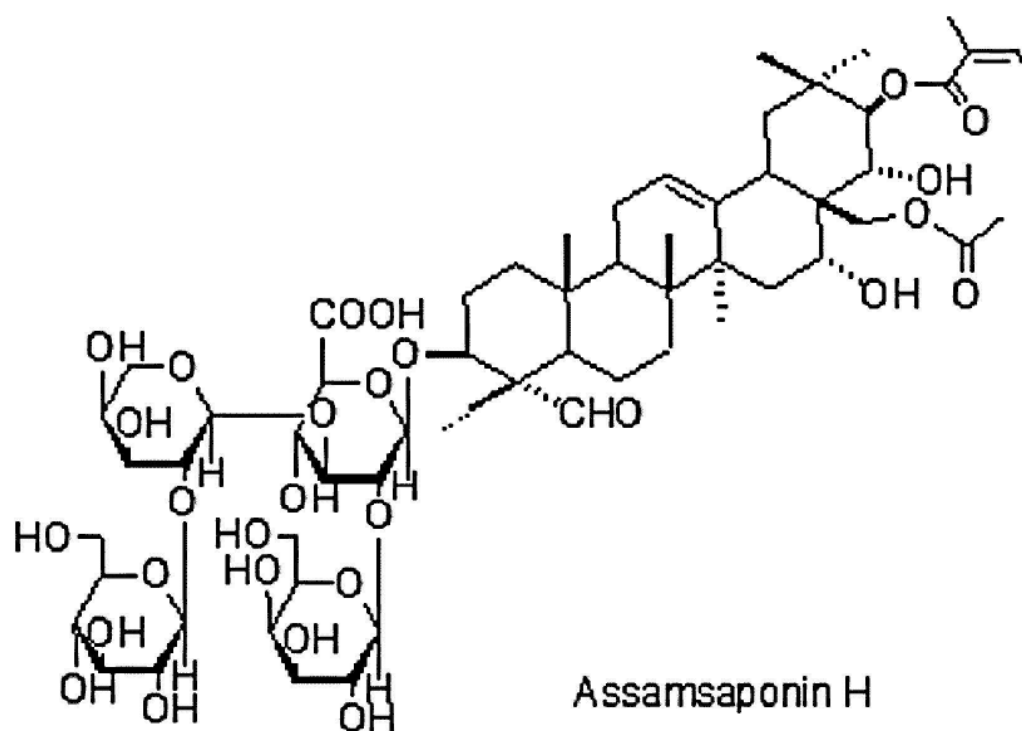
[Claim 1]

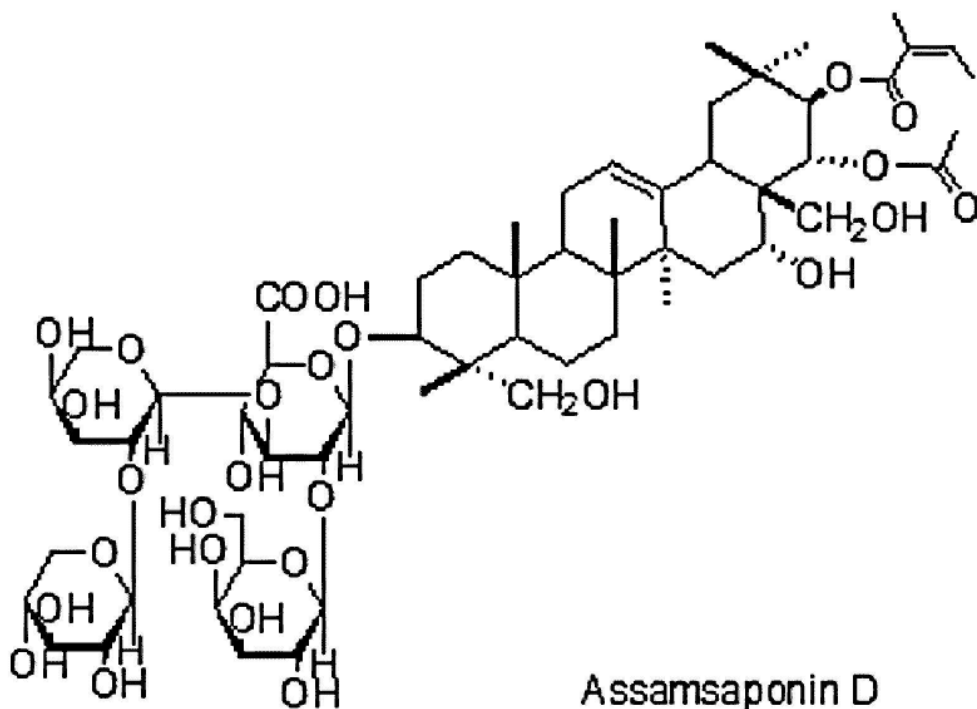
A composition for promotion of hair growth or hair restoration comprising one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which are represented by the following chemical formulas as an active ingredient:

[Chemical formulas]





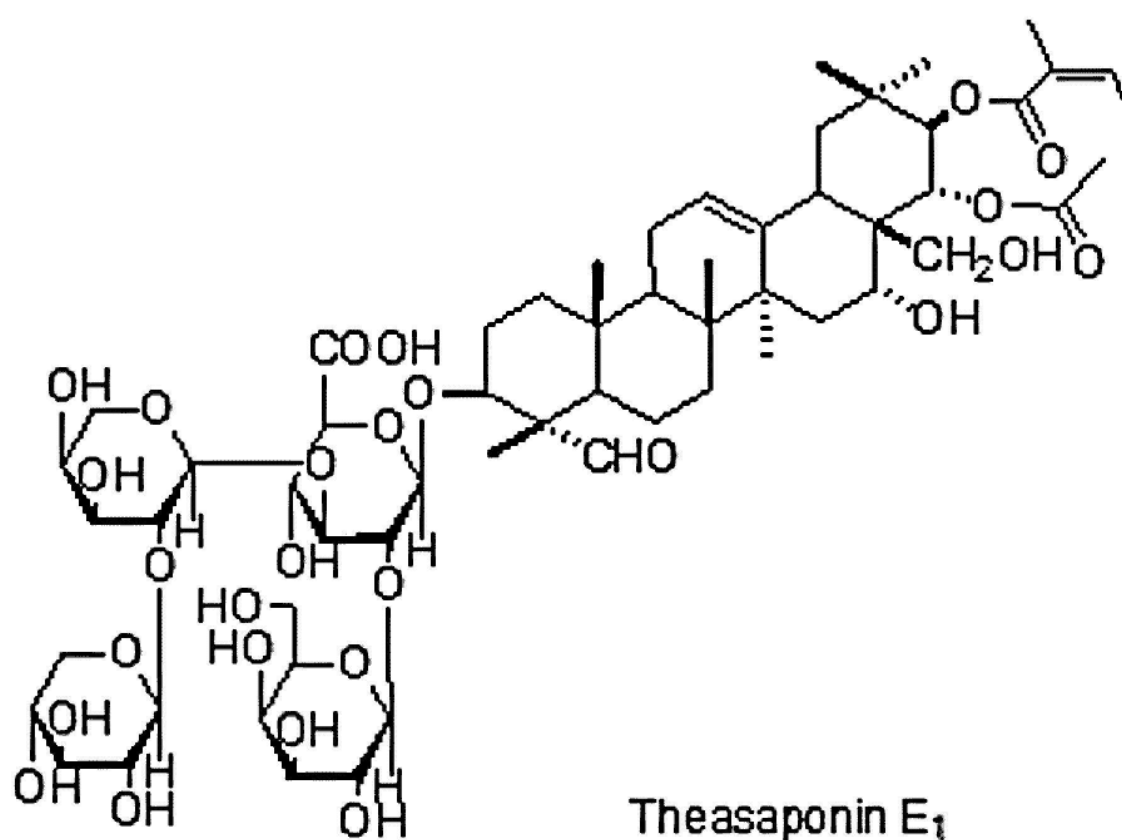
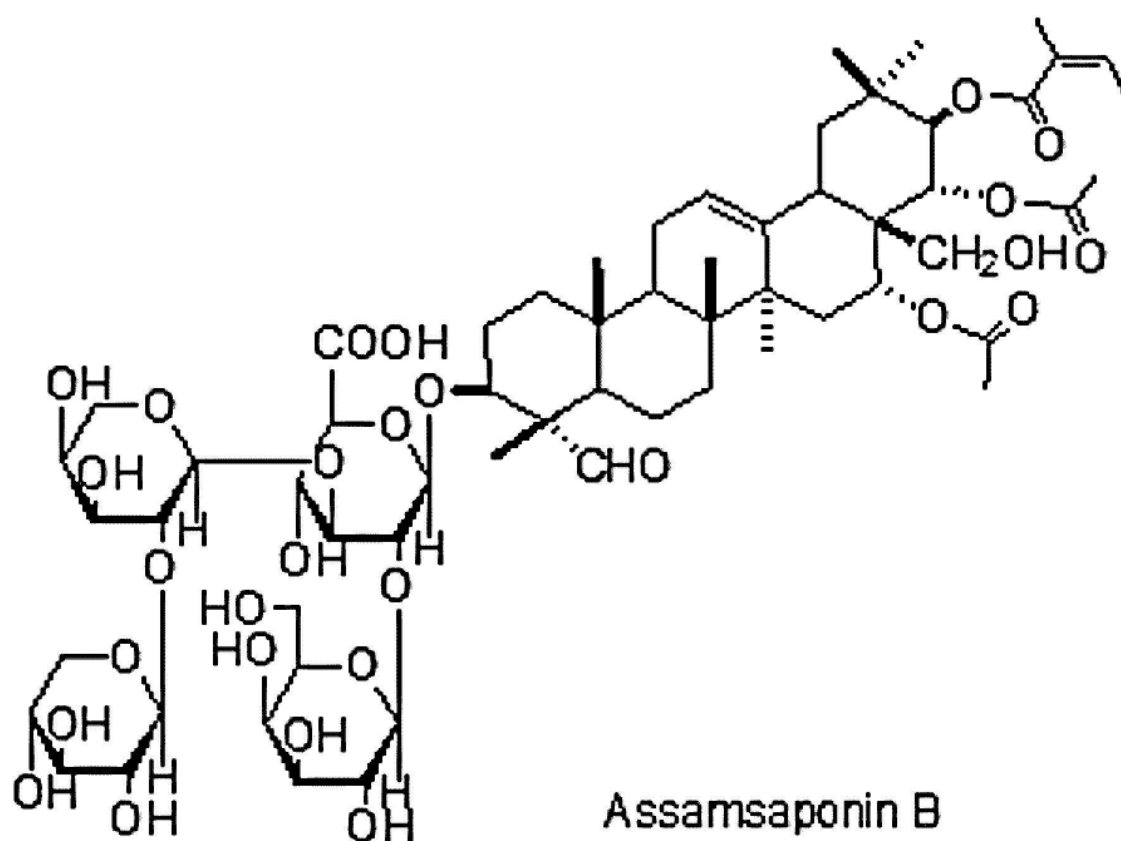


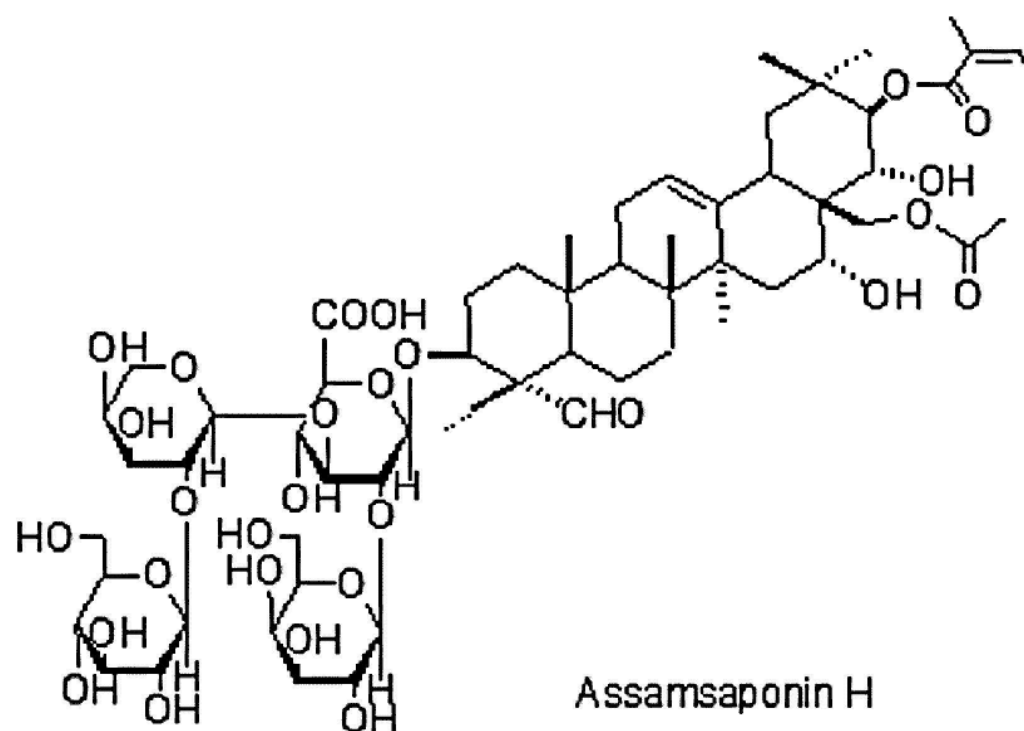
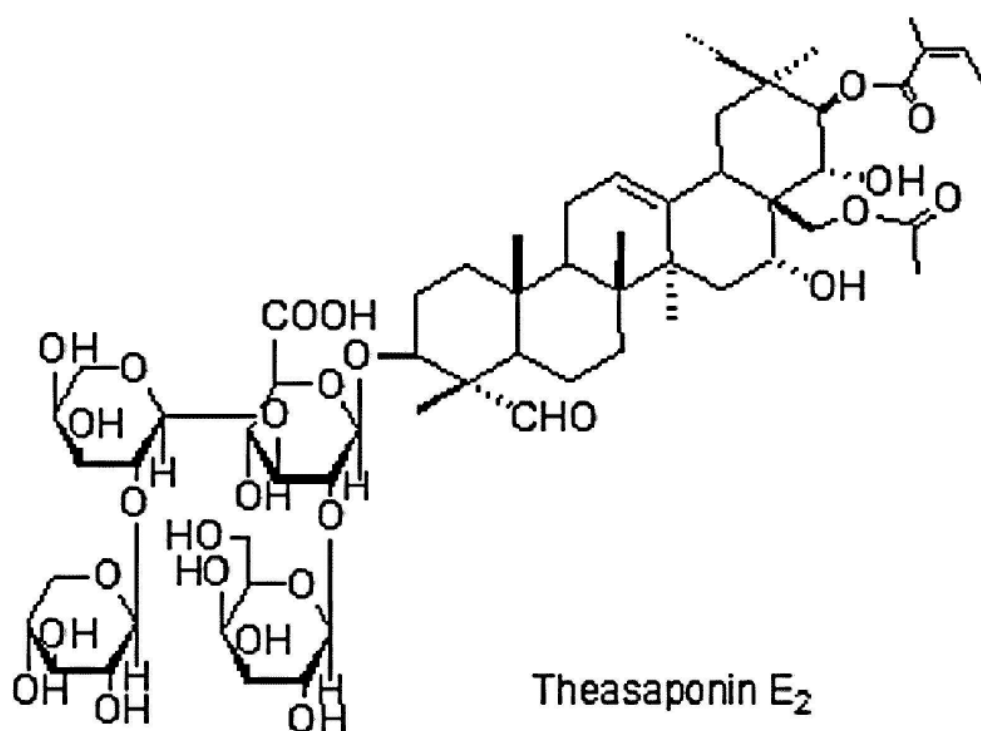


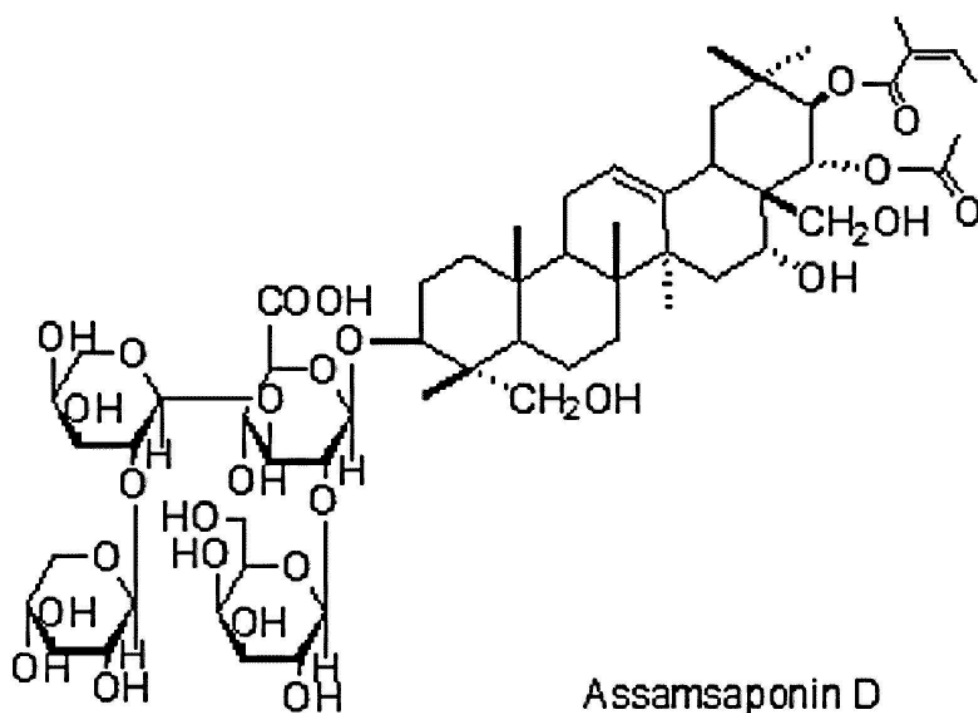
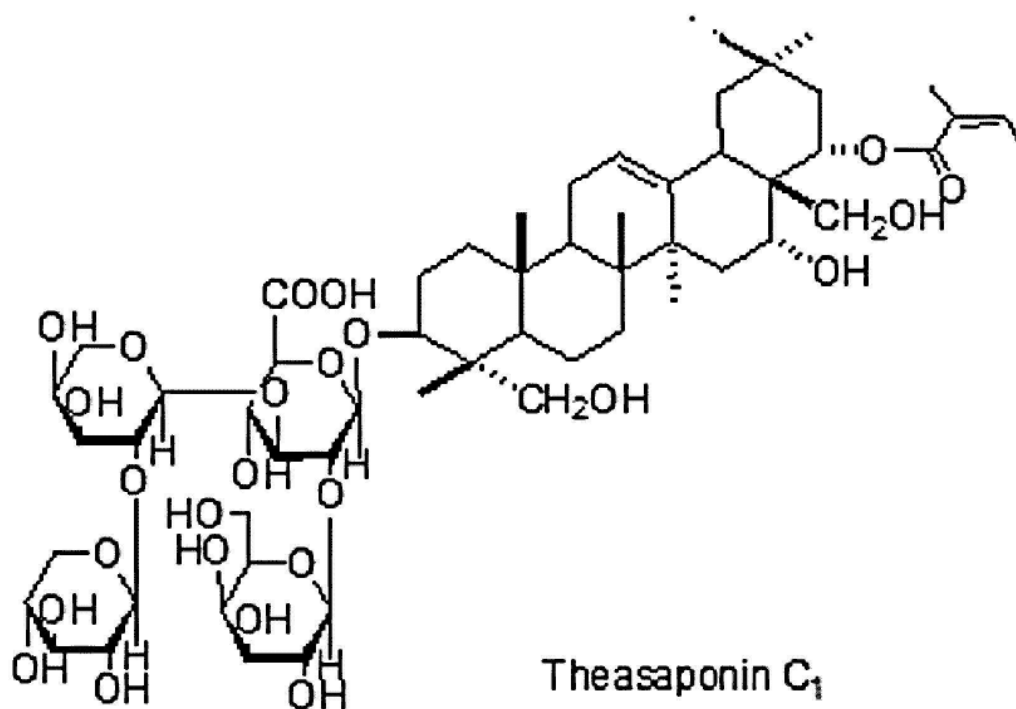
[Claim 2]

A composition for anti-inflammation comprising one or more selected from the group consisting of Assamsaponin B, Theasaponin E1, Theasaponin E2, Assamsaponin H, Assamsaponin D, and Theasaponin C1 which are represented by the following chemical formulas as an active ingredient:

[Chemical formulas]







[Claim 3]

The composition according to claim 1 or 2, wherein the active ingredient is isolated from camellia seed extract.

[Claim 4]

The composition according to claim 1, wherein the composition proliferates hair follicle dermal papilla cells.

[Claim 5]

The composition according to claim 2, wherein the composition inhibits production of PGE₂, IL-6, or IL-8.

[Claim 6]

The composition according to claim 1 or 2, wherein the active ingredient is comprised at from 0.001 to 20% by weight based on a total weight of the composition.

[Claim 7]

The composition according to claim 1 or 2, wherein the composition is a pharmaceutical composition.

[Claim 8]

The composition according to claim 1 or 2, wherein the composition is a cosmetic composition.

[Claim 9]

The composition according to claim 1 or 2, wherein the composition is a food composition.