



Preparation and Evaluation of Herbal Face Serum Using Blue Pea (*Clitoria ternatea*) Extract

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ABSTRACT:

The present study focuses on the formulation and evaluation of a herbal face serum using *Clitoria ternatea* extract. Herbal cosmetics are gaining popularity due to their natural origin, safety, and fewer side effects compared to synthetic products. *Clitoria ternatea* is rich in anthocyanins, flavonoids, and other phytoconstituents which possess antioxidant, antibacterial, and skin protective properties. The herbal serum was formulated using *Clitoria ternatea* extract along with distilled water, glycerin, propylene glycol, vitamin E, rose oil, sodium benzoate, and citric acid. The prepared serum was evaluated for various parameters such as physical appearance, pH, viscosity, spreadability, homogeneity, washability, and skin irritation test. The results showed that the formulation possessed good appearance, smooth texture, suitable pH, good spreadability, and satisfactory homogeneity. No irritation or redness was observed during the skin irritation study. The antioxidant activity of the plant extract may help in protecting the skin from oxidative stress and improving skin health. The study concludes that the formulated herbal face serum is safe, stable, and effective for cosmetic skin care application and has potential for use as a natural herbal cosmetic product.

Keywords: *Clitoria ternatea*, Herbal Face Serum, Herbal Cosmetics, Antioxidant Activity, Anthocyanins, Skin Care, Herbal Formulation, Antibacterial Activity, Natural Cosmetics, Skin Hydration

INTRODUCTION:

Herbal cosmetics are products formulated using various cosmetic ingredients along with one or more plant-based (herbal) ingredients to provide cosmetic benefits. These products are widely used for skincare, including cleansers, moisturizers, toners, and other daily-use formulations. Herbal cosmetics have gained significant popularity because of their natural origin, better activity, and comparatively fewer side effects than synthetic products. They contain bioactive compounds derived from plants, which help in improving the biological functions of the skin. These ingredients promote skin health by enhancing collagen production, maintaining keratin structure, and protecting the skin from damage caused by free radicals.

Since ancient times, herbal ingredients have been used in systems like Ayurveda for beautification and skin protection. With increasing awareness about the harmful effects of chemical-based cosmetics, there is a growing demand for natural and herbal cosmetic products. These formulations are considered safe, eco-friendly, and effective for maintaining healthy skin.

In recent years, herbal cosmetics have gained popularity because people are becoming more aware of the long-term side effects of chemical-based products. Unlike synthetic cosmetics that often give quick results, herbal products work in a gentle and gradual manner, supporting the body's natural healing process.

Another important aspect of herbal cosmetics is their eco-friendly and sustainable nature. Most herbal ingredients are biodegradable and less harmful to the environment, making them a better choice for both personal care and environmental protection.

Overall, herbal cosmetics combine beauty with wellness, focusing on safety, nourishment, and long-term benefits rather than just temporary effects.

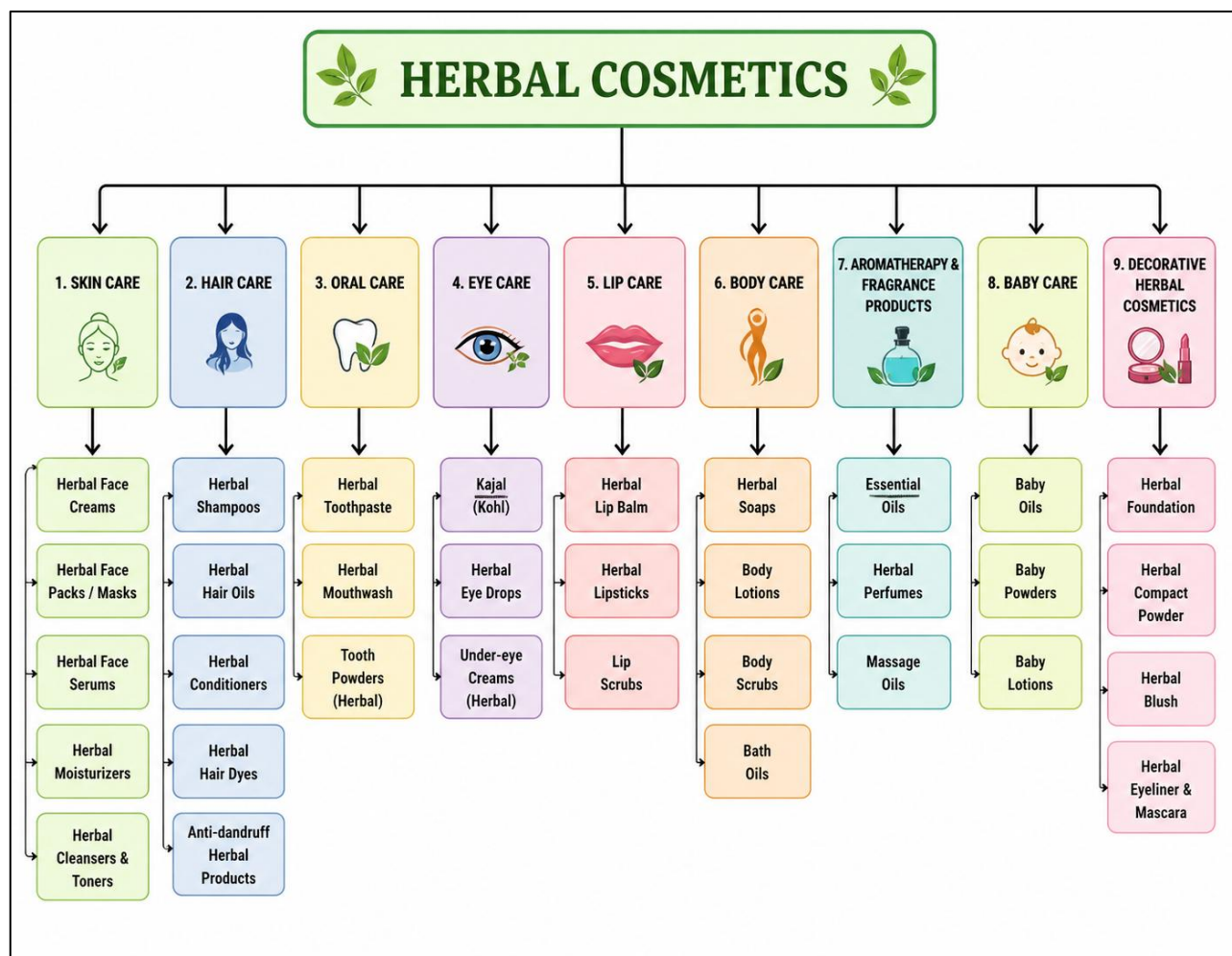


Fig.A. Grouping of Herbal Cosmetics

1.Skin Care Herbal Cosmetics :

These products are used to protect, nourish, and improve the skin.

They help in moisturizing, cleansing, and reducing problems like acne, dryness, and aging.

Examples: herbal creams, face packs, serums, cleansers, toners.

2. Hair Care Herbal Cosmetics:

These are used for hair growth, strength, and scalp health.

They prevent dandruff, hair fall, and dryness while improving shine and texture.

Examples: herbal shampoos, hair oils, conditioners, hair dyes.

3. Oral Care Herbal Cosmetics:

These products help in maintaining oral hygiene and preventing dental problems.

They reduce bad breath, tooth decay, and gum infections.



Examples: herbal toothpaste, mouthwash, tooth powder.

4. Eye Care Herbal Cosmetics:

These are used to protect and soothe the eyes and enhance beauty.

They help reduce dark circles, irritation, and eye strain.

Examples: kajal, eye drops, under-eye creams.

5. Lip Care Herbal Cosmetics:

These products are used to protect lips from dryness and damage.

They keep lips soft, hydrated, and attractive.

Examples: lip balm, lipstick, lip scrub.

6. Body Care Herbal Cosmetics:

These are used for overall body hygiene and skin care.

They cleanse, moisturize, and improve skin texture.

Examples: soaps, body lotions, scrubs, bath oils.

7. Aromatherapy & Fragrance Products:

These products provide relaxation, stress relief, and pleasant fragrance.

They also have therapeutic benefits for mind and body.

Examples: essential oils, perfumes, massage oils.

8. Baby Care Herbal Cosmetics:

These are mild and safe products specially designed for babies' sensitive skin.

They protect and nourish without causing irritation.

Examples: baby oil, baby powder, baby lotion.

9. Decorative Herbal Cosmetics:

These are used to enhance beauty (makeup) using natural ingredients.

They provide color and coverage while being safer than synthetic products.

Examples: foundation, compact powder, blush, eyeliner.

• **Types of Serum:**



1. Hydrating serum:

- Provides moisture to the skin
- Contains ingredients like glycerin, hyaluronic acid
- Suitable for dry and dehydrated skin

2. Anti-aging Serum:

- Reduces wrinkles, fine lines, and signs of aging
- Rich in antioxidants like Vitamin C, Vitamin E
- Helps improve skin elasticity

3. Brightening Serum:

- Improves skin tone and reduces pigmentation
- Contains Vitamin C, niacinamide
- Gives glowing and even complexion

4. Anti-acne Serum:

- Controls acne and reduces inflammation
- Contains salicylic acid, tea tree oil
- Suitable for oily and acne-prone skin

5. Exfoliating Serum:

- Removes dead skin cells



- Contains AHAs/BHAs (like glycolic acid)

- Improves skin texture and smoothness

6. Firming Serum:

- Tightens skin and improves elasticity
- Contains collagen-boosting ingredients
- Helps in skin lifting effect

7. Repair Serum:

- Repairs damaged skin and improves skin barrier
- Contains peptides, ceramides
- Useful for sensitive or damaged skin

8. Oil-based Serum:

- Nourishes and deeply moisturizes skin
- Contains natural oils like rose oil, argan oil
- Best for dry skin

Among the various types of serums, herbal serums are gaining popularity due to their natural origin and safety. Therefore, in the present study, *Clitoria ternatea* was selected as a key ingredient for serum formulation.

Clitoria ternatea, commonly known as butterfly pea, is a traditional medicinal plant widely used in herbal medicine and as a natural food colorant. It belongs to the Fabaceae family and is commonly found in India and other tropical regions. The flowers of this plant are rich in bioactive compounds, especially anthocyanins, which are responsible for its characteristic blue color.

Anthocyanins are a group of flavonoid compounds known for their strong antioxidant, antimicrobial, and anti-inflammatory properties. These compounds help in protecting the skin from oxidative stress caused by free radicals, which is one of the main causes of skin aging and damage. The flowers of *Clitoria ternatea* contain specific anthocyanins known as ternatins, along with other phytochemicals like quercetin, kaempferol, and myricetin derivatives.

Previous studies have demonstrated that extracts of *Clitoria ternatea* exhibit significant biological activities, including antioxidant, antibacterial, and cytotoxic effects. The antioxidant activity helps in neutralizing reactive oxygen species (ROS), thereby preventing cellular damage and promoting healthy skin. Additionally, its antibacterial properties make it useful in preventing skin infections and improving overall skin health.

Due to these beneficial properties, *Clitoria ternatea* extract has great potential for use in cosmetic formulations such as herbal face serums. Herbal serums formulated with natural ingredients are gaining popularity because they are safer, eco-friendly, and have fewer side effects compared to synthetic products. Therefore, the development of a herbal serum using *Clitoria ternatea* extract can provide antioxidant protection, enhance skin appearance, and support skin health naturally.

Chemically, the flowers contain various important phytoconstituents such as:

- Anthocyanins (ternatin A, B, C, D series)
- Flavonols like quercetin, kaempferol, and myricetin derivatives

These compounds contribute to the plant's high antioxidant potential and stability.

The anthocyanins present in *Clitoria ternatea* are **polyacylated**, which makes them more stable compared to other plant pigments. This stability is especially useful in cosmetic and pharmaceutical formulations, as it helps maintain color and activity over time.

Several biological activities of *Clitoria ternatea* have been reported:

- **Antioxidant activity:** Helps neutralize free radicals and reduce oxidative stress
- **Antibacterial activity:** Effective against bacteria like *Bacillus* and *E. coli*
- **Cytotoxic activity:** Shows potential effects on certain cell lines
- **Therapeutic potential:** Includes antidiabetic and protective effects

These properties make the plant highly valuable for use in functional foods, nutraceuticals, and cosmetic formulations.

Additionally, oxidative stress caused by reactive oxygen species (ROS) can damage skin cells and lead to aging and other disorders. The antioxidant compounds in *Clitoria ternatea* help reduce this damage, making it an ideal ingredient for herbal skincare products like serums.



Fig.1: Blue pea Flower

• **Importance:**

The butterfly pea flower is an important herbal ingredient used in the development of herbal face serum due to its various beneficial properties for skin care. The flower is rich in anthocyanins, flavonoids, and other phytochemicals which provide strong antioxidant activity. These antioxidants help in protecting the skin from oxidative stress and free radical damage, thereby reducing signs of aging such as wrinkles and dullness.

The flower also possesses antibacterial and anti-inflammatory properties which help in preventing skin infections, soothing irritation, and maintaining healthy skin. The natural blue pigment called ternatin present in the flower enhances its cosmetic value and makes it suitable for herbal skincare formulations.

In addition, *Clitoria ternatea* helps in improving skin hydration, promoting skin glow, and protecting the skin from environmental damage. Due to its natural origin and safety, it is considered a promising ingredient for herbal cosmetic products like face serums.

• **Benefits of Clitoria ternatea Herbal Face Serum:**

1. Antioxidant Activity:

The serum contains anthocyanins and flavonoids which help in neutralizing free radicals and protecting the skin from oxidative stress.

2. Anti-aging Effect:

It helps in reducing wrinkles, fine lines, and signs of premature aging by protecting skin cells from damage.



3. Skin Brightening:

The serum improves skin tone and enhances natural skin glow, making the skin look fresh and healthy.

4. Hydration:

Ingredients like glycerin and rose water help in maintaining skin moisture and preventing dryness.

5. Antibacterial Property:

The extract possesses antibacterial activity which helps in reducing acne-causing microorganisms and maintaining healthy skin.

6. Soothing Effect:

The herbal ingredients provide a cooling and soothing effect, helping to reduce irritation and redness.

7. Protection from Environmental Damage:

The antioxidant compounds protect the skin from pollution, UV-induced stress, and environmental damage.

8. Natural and Safe:

Being herbal in nature, the serum has fewer side effects compared to synthetic cosmetic products and is suitable for regular use.

9. Improves Skin Texture:

Regular application helps in making the skin soft, smooth, and healthy.

10. Eco-friendly Cosmetic Product:

The formulation uses plant-based ingredients, making it a sustainable and eco-friendly skincare product.

• Formulation of Blue pea flower Extract:

The formulation of herbal face serum was carried out by incorporating Clitoria ternatea flower extract into a suitable serum base containing moisturizing and stabilizing agents.

The selection of Clitoria ternatea was based on its beneficial properties for skin care. The presence of anthocyanins provides excellent antioxidant activity, which helps in reducing free radical damage and delaying signs of aging. The plant also exhibits antibacterial activity, which helps in preventing skin infections. Additionally, it improves skin texture and enhances natural skin glow, making it suitable for cosmetic formulations such as herbal face serums.

The formulation was prepared using various herbal and cosmetic ingredients such as Clitoria ternatea extract, distilled water, glycerin, propylene glycol, vitamin E, rose oil, sodium benzoate, and citric acid. Each ingredient was selected based on its specific role in improving stability, hydration, skin protection, and overall effectiveness of the serum.

1. Clitoria ternatea Extract:

Clitoria ternatea extract is rich in anthocyanins and flavonoids which provide antioxidant and antibacterial activity. It helps in protecting the skin from oxidative stress and improves skin glow.

2. Distilled Water:

Distilled water is used as a solvent and base in the formulation. It helps in dissolving ingredients and maintaining uniform consistency of the serum.

3. Glycerin:

Glycerin acts as a humectant and moisturizer. It helps in retaining moisture and keeps the skin hydrated and soft.

4. Propylene Glycol:

Propylene glycol is used as a penetration enhancer and solvent. It improves absorption of active ingredients into the skin.

5. Vitamin E:

Vitamin E acts as an antioxidant and protects the skin from free radical damage. It also nourishes and moisturizes the skin.

6. Rose Oil:

Rose oil is used as a fragrance and soothing agent. It provides pleasant aroma and calming effect to the skin.

7. Sodium Benzoate:

Sodium benzoate is used as a preservative to prevent microbial growth and improve shelf life of the formulation.

8. Citric Acid:

Citric acid is used for pH adjustment and helps maintain skin-compatible pH of the serum.

• Materials and Methods of Serum :

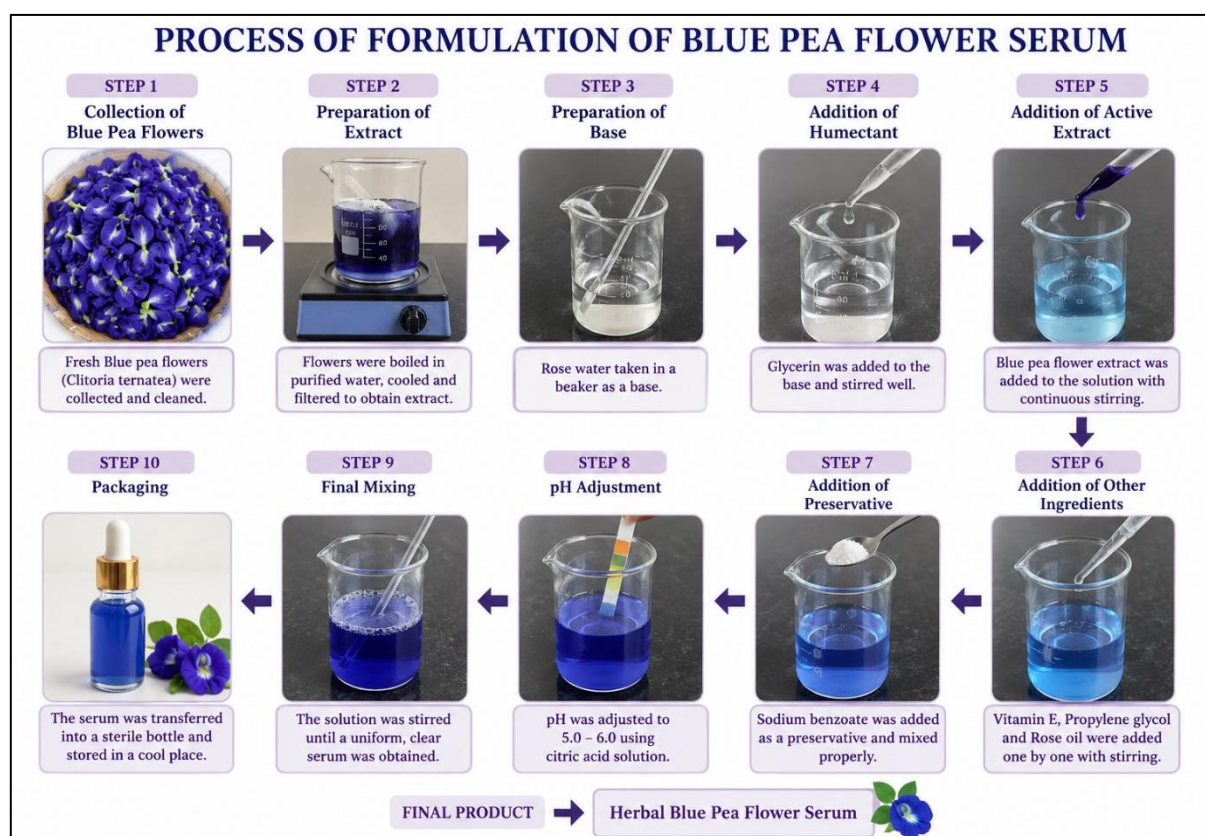


Fig 2: Procedure of formulation Serum

1. Collection and Drying of Blue Pea flower :

Fresh flowers of *Clitoria ternatea* were collected from a suitable source. The flowers were carefully selected and washed thoroughly with distilled water to remove dust, dirt, and other impurities.



Fig3: Collection of Blue Pea flower

The collected flowers were shade dried at room temperature for several days to remove moisture content. Shade drying was preferred to protect the active phytoconstituents present in the flowers from degradation caused by direct sunlight.



Fig4: Drying of flower

2. Preparation of Extract:

The dried flower powder was mixed with distilled water and kept for extraction by maceration method with continuous stirring. After extraction, the mixture was filtered using muslin cloth and filter paper to obtain clear *Clitoria ternatea* extract.



Fig5 Preparation of extraction of flower

3. Preparation of Serum Base:

A required quantity of distilled water was taken in a clean beaker. Glycerin was added as a moisturizing agent and mixed properly. Propylene glycol was then added slowly with continuous stirring to obtain a uniform base.



Fig6 Preparation of Base

4. Addition of Humectant:

Glycerin was added into the base and stirred properly. Glycerin acts as a humectant and helps in maintaining skin hydration and moisture.



Fig7 Addition of Humectant

5. Addition of Active Extract:

The prepared Clitoria ternatea extract was slowly added into the solution with continuous stirring to ensure uniform distribution throughout the formulation.



Fig8 Addition of Active Extract

6. Addition of Other Ingredients:

Vitamin E, propylene glycol, and rose oil were added one by one with continuous stirring. Vitamin E acts as an antioxidant, propylene glycol improves absorption, and rose oil provides fragrance and soothing effect.



Fig9 Addition of other Ingredients

7. Addition of Preservative:

Sodium benzoate was added as a preservative to prevent microbial contamination and improve shelf life of the serum.



Fig10 Addition of Preservative

8. pH Adjustment:

The pH of the formulation was adjusted to about 5.0–6.0 using citric acid solution to make the serum suitable and safe for skin application.



Fig11 pH Adjustment

9. Final Mixing:

The complete formulation was stirred continuously until a uniform, smooth, and clear serum was obtained.



Fig12 Final Mixing

10. Packaging:

The prepared herbal blue pea flower serum was transferred into a sterile airtight bottle and stored in a cool place for further use and evaluation.



Fig13 Packaging

• Evaluation tests of Serum:

1. Physical Appearance
2. pH Determination
3. Viscosity
4. Spreadability
5. Homogeneity
6. Washability
7. Skin Irritation Test



• Results and Discussion:-

1. Physical Appearance:

The prepared formulation was visually examined for color, clarity, texture, and consistency.

Table.1: In this test physical appearance of serum was checked

Sr.no	Formulation Parameters	Observation
1.	Colour	Bluish
2.	Appearance	Smooth and clear
3.	Texture	Soft and uniform
4.	Consistency	Good
5.	Homogeneity	Homogeneous
6.	Odour	Pleasant characteristic odour

2. pH Determination:

The pH of the formulation was determined using a digital pH meter to ensure compatibility with skin.

Table.2: pH observation table

Parameter	Observation
pH of Formulation	5.5 – 6.5
Stability of pH	Stable during storage

3. Viscosity:

The viscosity of the serum was evaluated using a viscometer to determine flow property and consistency of the formulation.

Table.3: Viscosity observation table

Parameter	Observation
Viscosity	Moderate
Consistency	Smooth
Flow Property	Good

4. Spreadability:

Spreadability of the serum was determined by applying a small amount on skin and observing ease of spreading.

Parameter	Observation
Spreadability	Good
Uniformity	Spread uniformly

5. Homogeneity:

The formulation was visually inspected for uniformity and absence of lumps or phase separation.

Table.4: Homogeneity observation table

Parameter	Observation
Homogeneity	Homogeneous
Phase Separation	Not observed



6. Washability:

Washability test was performed to determine the ease of removal of the herbal face serum from the skin surface using water.

Table.5: Washability observation table

Parameter	Observation
Washability	Easily washable

7. Skin Irritation Test:

The serum was applied on a small area of skin to check for irritation or allergic reaction.

Table.6: Irritancy study observation

Parameter	Observation
Skin Irritation	Not observed
Redness	Absent
Itching	Absent
Allergic Reaction	Not observed

• Conclusion:

The present study successfully formulated and evaluated a herbal face serum containing *Clitoria ternatea* extract. The formulation showed satisfactory physicochemical properties such as good appearance, suitable pH, homogeneity, spreadability, and washability. The serum was found to be stable and did not produce any skin irritation during evaluation studies.

The presence of anthocyanins and flavonoids in *Clitoria ternatea* provides antioxidant and antibacterial properties which may help in protecting the skin from oxidative stress and improving skin health. The herbal ingredients used in the formulation also contribute to hydration, nourishment, and enhancement of skin texture.

Overall, the developed herbal face serum can be considered a safe, effective, and natural cosmetic formulation suitable for skin care application.

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