

Comparative Analysis of Traditional Herbal Extracts V/s Modern Synthetic Ingredients in Skincare Product Formulations

Saraswati Purohit¹, Dr. Rajashree Saoji², Dr. Vibha Kapoor³

¹*Student of Msc. Beauty cosmetology, Department of Beauty Cosmetology, School of Design, Sandip University, Nashik, India*

²*HOD Beauty Cosmetology, School of Design, Sandip University, Nashik, India*

³*Dean, School of Design, Sandip University, Nashik, India*

Abstract—Nowadays skincare and cosmetic terrane, consumer vigilance has developed vividly. There is a progressive transformation from transitory beauty solutions to more panoramic, sustainable, and ingredient perceptive choices. This research focuses on the formulation and evaluation of a multifunctional skincare product a dual action face scrub combined with a peel-off mask designed using herbal ingredients like poppy seeds, tamarind peel powder, and sandalwood powder. These ingredients were selected not only for their conventional applicability in skincare but also for their precisely backed properties such as exfoliation, moisturization and skin soothing effects.

The progressive purchaser is increasingly perceptive to the origin, safety, and long-term impact of cosmetic ingredients. With uprising distree over the environmental impact and rigor of synthetic component like microplastic and there is a growing demand for products that are not only effective but also gentle on the skin and decomposable. In response to this shift, the focus of research is to create a formulation that offers the dual benefits of a mild scrub and an effective peel-off mask, using essentially plant origin ingredients.

A unique skincare batch was developed by carefully merging herbal components to create a smooth, persistent, and effective product. The outcome of the formulation is having fine texture that exfoliates effortlessly, washes off easily, and retains a stable pH between 4.5 and 5.5 to match the skin's natural pH. The exfoliating particles like poppy seeds and tamarind peel powder are gentle yet effective in removing the dead skin cells from the surface of the skin, offering visible glowing effect.

The formulation process involves careful sourcing of raw materials. Poppy seeds were cleaned and dried to preserve their purity, tamarind peels were dried-up and crushed into fine powder, and sandalwood powder was

retrieved from trusted suppliers. The base for the formulation included Polyvinyl Alcohol and polyvinylpyrrolidone as a film-forming agent, glycerine for humectant, and gums for maintaining consistency. A sweet vanilla fragrance is added for calming effect and natural preservatives were used like phenoxyethanol to improve product stability.

Evaluation parameters includes both physical and chemical parameters as well as sensory characteristics. Results revealed that the hybrid formulation not only cleanses and exfoliates the skin but also provides hydration, improves skin tone, and enhances luminosity without conciliatory on safety. prominently, the use of eco-friendly, plant-based exfoliants coordinate with current viability trends and evade the environmental damage frequently generated by synthetic scrubbing agents.

Moving forward, the study opens up various route for further research and development. Subsequent work could include clinical trials on larger groups, augmented stability testing under various environmental factors, integration of specialized herbal extracts for aimed treatments such as anti-acne or anti-aging.

In summary, the study effectively reveals the potential of combining natural exfoliants with peel-off mask technology to create a skincare product that is safe, sustainable and consumer-centric.

Index Terms—Scrub, peel off mask, exfoliation, poppy seed, tamarind peel powder, moisturization, plant based, sandalwood powder

I. INTRODUCTION

In the past few years, the global skincare and cosmetic industry have undergone a remarkable evolution. There is a heightened awareness among consumers

about the ecological and safety aspects of cosmetic ingredients.⁽¹⁾

Now a days consumers are more focused on origins, composition and long run effects of the ingredients used in the product formulation rather than superficial results of some skincare formulations. Therefore, the demand for skincare and cosmetic products that are Formulated with herbal, plant-origin ingredients has surged.⁽⁸⁾

On the other hand, herbal and plant-based ingredients have been used in traditional medicine and in beauty industries from eternity and valued for their multifunction advantages and minimal side effects. The revival of interest in herbal based formulations is endorsed by indigenous knowledge and novel discovery, which ratifys the effectiveness of many plant-originated ingredients in fostering skin health.⁽²⁾ Herbal Ingredients like poppy seeds, tamarind peel powder, Walnut shell, Red Lentils, Chickpea, Turmeric powder, Coffee and sandalwood powder imparts exfoliating, antimicrobial, anti-inflammatory, antioxidant properties that are both soothing and powerful.⁽¹⁾⁽¹⁵⁾ When it winds up at exfoliation, herbal scrubbing is less abrasive and is designed for enhanced comfort and ease of use on the skin alternative to synthetic scrubs.⁽⁵⁾ Contrasting micro-plastics, which are generally harsh on the skin and Destructive towards the environment.⁽³⁾ In contrast some of the natural exfoliants like sandalwood powder, Coffee Powder, Chickpea powder, Oats powder Tamarind peel powder, or poppy seeds offer gentle yet effectual exfoliation. These phytogenic substances are rich in antioxidants and natural oils, that helps to remove dead skin cells, over and above also helps to nurture the skin during the process.⁽¹¹⁾ Additionally, they incline to be biodegradable, safeguarding marine life and low emission in the long term. End users are also becoming more ingredient-aware, leaning towards products that a line with their prosperity and long -term values making herbal scrubbing a judicious and Deliberate choice.⁽⁵⁾

This research aims to examines and compare the potency, strength, skin friendly and environmental consequences of Herbal vs synthetic ingredients in the Formulation of a hybrid skincare product a scrub Combined with a peel-off mask.⁽¹⁾ The central focus is to denote that herbal ingredients not only match but often go beyond the perpetration of synthetic ingredients when formulated appropriately with the

intention to meet the rising demand from consumers for herbal skincare products, by using natural compounds to ensure a safer alternative to synthetic products. As they are easy to use and work well for treating skin issues including exfoliating, moisturizing and skin tightening properties.

The study reveals that the scrub with peel off mask formulation helps in cleaning the pores, hydrates and improves the luminosity of the face at the same time also auspiciously removes the dead cells and promotes even skin tone. Nevertheless, it is vital to use exfoliants precisely and in moderation to avoid over-exfoliation, which can lead to irritation and damage to the skin.⁽⁹⁾

II. EXFOLIATION

Exfoliating agents are materials used in skincare to slough of skin debris from the epidermal surface. Two primary kinds of exfoliants exist:

Mechanical Exfoliation: These function through manual sloughing off skin debris through friction, using abrasive particles or tools. Common examples include Ground coffee, rice powder, red lentils, tamarind powder, apricot pits, almond shells, pumice stone, Facial brushes or sponges.⁽⁷⁾⁽¹⁶⁾⁽¹⁸⁾

Chemical Exfoliants: Chemical exfoliation method includes acids, non- acid peels, enzyme or other chemical actives. chemical exfoliation involves the use of formulation that are of consist of chemical compounds that weakens the bonds a quick way of removing dead skin cells from the outer layer of the skin, it can do everything from brightening complexion to fading acne scars.

chemical exfoliants like glycolic and lactic acid are commonly used AHAs in skin care, BHAs include salicylic acid and tropic acid.⁽¹¹⁾ these enzymes help to loosen the glue-like substance that hold the cells together and allow them to shed off. which break downs the dead skin cells naturally without any rigorous scrubbing. chemical exfoliation improves the skin texture, reduces fine line, hyperpigmentation and treats acne.⁽⁷⁾⁽¹⁶⁾⁽¹⁸⁾

Due to variations in skin type and different condition the physical or chemical exfoliators are chosen. Nowadays chemical exfoliators are gaining more importance due to their instant effect. The natural raw materials used as cosmetic exfoliators are safer to use than synthetic raw materials Despite the fact that exfoliation removes the dead skin and give natural and

instant glow it's essential to use them carefully to avoid excessive exfoliation, which can lacerate the skin.⁽⁹⁾

Peel-off mask: Peel-off mask offers practicality by effectively removing impurities, dead skin cell, helps to reduce fine lines and wrinkles also promotes even skin tone by reducing pigmentations. Peel-off masks have gained popularity due to their accessibility and effectiveness in addressing various skin conditions like exfoliation, moisturization, and skin tightening.⁽²⁾⁽⁶⁾ This study focuses on an herbal based peel-off mask including scrub particles to give beneficial effects, which combined natural ingredients like poppy seeds, tamarind powder, glycerine and sandalwood power, gums known for their anti-oxidative, anti-inflammatory, anti-aging, and moisturizing properties. which contributes to its stability, pH balance, and effective peeling. According to the study, this peel-off mask not only improves skin hydration and radiance but also helps in removing skin pigmentation and dead skin cells. Additionally, it successfully minimises enlarged pores without causing discomfort, maintaining moisture level while cleansing the skin health.⁽²⁾⁽¹⁰⁾

III. TYPES OF PEEL-OFF FACE MASKS

Peel-off masks are a popular skincare treatment that come in four main types, each with unique benefits and property:

1. Pull-Off Masks

These masks are typically applied as a single, continuous layer on the skin. Once left to dry for about half an hour, the sheet is pulled off. They are highly effective in removing the topmost layer of ageing, dead skin cells also reduce excess oil and helps in unclogging the pores from the surface of the skin. These types of masks are preferred for cleansing and revitalizing the skin, revealing a fresher, glowing and even tone complexion to the skin and promotes healthier skin.⁽⁶⁾

2. Sheet Masks

Face Sheet masks have the unique ability to deliver intense hydration and nourishment, resulting in maximum benefits for skin. they are usually infused with active ingredients like anti-aging or whitening agents' helps in deep moisturization and revive dull and tired skin result in natural glow. The sheet itself

ensures that the serum remains in place, stabilizing and structuring the product for maximum effectiveness. The key here is that minimal stabilizers are needed, as the sheet provides the necessary support for the active ingredients. we can see noticeable results for dullness, uneven skin tone, and redness giving your skin visible plumping and radiance. they are perfect fit for every skin type with every concern.⁽⁶⁾

3. Leave-On Masks

Leave-on peel-off masks are incredibly hydrating and come in a cream or gel form. As they are available either in cream or gel form, they contain butters, oils and vitamins that help rejuvenate and restore the skins barrier function. these formulations are perfect for providing deep moisturization and a touch of indulgence to skin. These masks are applied and left on the skin for a duration of 15 to 30 minutes.⁽⁶⁾

4. Clay Masks

When it comes to drawing out impurities and unclogging pores, clay masks are the go-to choice. They improve skin texture by its tightening effect on the pore size. some clay masks have added beneficial ingredients to help combat acne breakouts and serve as essential skincare cleansers. They are effective drawing out toxins and impurities from the skin, making them ideal for people with oily or acne-prone skin. it is great for all skin type when used briefly on the skin as the mask dries, it tightens and firms, leaving skin complexion feel smooth and refined. we must make sure it does not dry on the skin, so it should be applied for only 3-4 minutes.⁽⁶⁾

IV. BENEFITS OF SCRUB PLUS PEEL-OFF MASK

Formulation combines the gentle exfoliating particles of a scrub with the cleansing effect of a peel-off mask. The scrub particles help in removing skin debris while the mask provides deep cleansing effect and detoxifies the skin, leaving the skin feel fresh and smooth.⁽⁷⁾⁽¹¹⁾ Scrubbing helps in removing skin debris from the surface layer, while peel-off mask helps in eliminating impurities and excess oil from the pores.⁽⁷⁾ Ingredients which are rich in contents like oils, vitamins, botanical extract and emollients were used for formulations to get nourishing, moisturizing and soothing effect on the skin.⁽⁷⁾⁽¹¹⁾

The products were formulated using natural ingredients that are gentle yet effective and safer for all skin type including sensitive skin as compared to synthetic materials which are harsh and can cause irritation to skin. ⁽⁷⁾

V. DRAWBACKS OF SCRUB PLUS PEEL-OFF MASK

Due to multipurpose formulation these can be expensive as compared to individual product and they are formulated using high quality and natural ingredient which can also leads to higher price point. ⁽⁷⁾

These formulations consist of natural ingredients which are gentle yet effective and can also be used for sensitive skin, but they are not intense and cannot provide deep exfoliation like synthetic materials which are made up of plastic polymers. ⁽⁷⁾

Formulations which are made using herbal ingredients may have shorter shelf life as compare to synthetic formulations. Because the preservatives that are used in herbal formulation are not strong like synthetic preservatives therefore may need to use more quickly to avoid spoilage. ⁽⁷⁾

VI. PLANT PROFILE:

1. Poppy Seeds

Common name:	Bread seed poppy
Kingdom:	Plantae
Family:	Papaveraceae
Species:	p.somniferum



Fig.1 Poppy Seed Plant
(<https://share.google/P4GCoTDoZDYSCzrH>)

Poppy seeds are widely used for their medicinal effect like pain relief as they contain active components like

magnesium, zinc and iron which makes them ideal choice. They also contain carbohydrates, fats and proteins.

which makes poppy seed effective in nature.

The main purpose of using poppy seeds in cosmetics is due to their gentle exfoliating property they act as natural anti-inflammatory benefits and promotes healthy skin

It helps in restoring moisture and give youthful glow. ⁽⁵⁾⁽¹¹⁾⁽¹²⁾

2. Tamarind Peel Powder

Common name:	Imli
Kingdom:	Plantae
Family:	Fabaceae
Species:	T. indica



Fig.2 Tamarind Peel
(<https://share.google/wttUMqfYpRUBF1Fp9>)

Tamarind peel powder is often used in skincare for its ability to promote brightening effect and even skin tone. They are known for their natural cleansing and exfoliating properties, which makes them ideal choice for maintaining healthy and glowing skin.

Tamarind peel contains antioxidant property which helps to reduce the aging signs and improves skin texture by gently removing skin debris. They also contain minerals like calcium and magnesium which helps them to balance the skin's hydration and skin texture. ⁽⁵⁾⁽¹³⁾⁽¹⁷⁾

3. Sandalwood Powder

Common name:	Indian sandalwood
Kingdom:	Plantae
Family:	Santalaceae
Species:	S. album



Fig. 3 Sandalwood
(<https://share.google/VPidN4n4Haj2SESMd>)

Sandalwood is an acclaimed material in skincare cosmetics for its ability to improve skin tone, soothing and glowing effect. It is rich in antioxidant which protects the skin from external environment stressors. It helps to reduce inflammation, calm irritated skin and promotes refreshing, cooling effect.

It has naturally germicidal properties, making it a wise choice for exfoliation. ⁽⁵⁾⁽⁸⁾⁽¹⁴⁾

VII. MATERIAL AND METHOD

Collection And Preparation:

Poppy Seeds:

- Collected from local markets.
- Washed thoroughly with distilled water to remove dust and impurities.
- Dried by wiping with a clean cloth and air-dried for several hours until completely dry.



Fig. 4 Poppy seeds (SELF)

Tamarind Peel Powder:

- Peels were carefully sourced from fresh tamarind fruits.
- Cleaned to remove pulp and impurities.
- Sun-dried, then pulverized and sieved for uniform and smooth texture.



Fig. 5 Tamarind Peel Powder (SELF)

Sandalwood Powder:

- Sourced from trusted suppliers of high-quality sandalwood.
- Cleaned to remove any surface dirt.
- Ground into fine powder and sieved to ensure uniform texture



Fig. 6 Sandalwood Powder (SELF)

Formulation table

Ingredients	Uses	Quantity
Purified water	Solvent	85.76
Polyvinyl alcohol	Film-former	4.4
Polyvinylpyrrolidone	Film-former	4.4
Poppy seed	Exfoliant	0.4
Tamarind peel powder	Exfoliant	0.8
Sandalwood powder	Soothing agent	0.1
Glycerine	Humectant	0.7
Tragacanth	Thickener	2
Gum guar	Thickener	0.2
Phenoxyethanol	Preservative	0.94
Essential oil	Fragrance	0.3

Procedure:

- Accurately weigh Polyvinyl Alcohol using scale balance in a separate beaker and weigh required quantity of purified water.
- Heat gently at 70°C–80°C while slowly adding PVA until a clear solution forms.
- In another beaker take required quantity of lukewarm water, dissolve the gums and stir well uniformly until gums are dissolved.

4. Add a mixture of glycerine and sandalwood and stir thoroughly until smooth paste is formed.
5. Gradually incorporate the active ingredients in above solution.
6. Dissolve a small quantity of sodium benzoate in warm water and add it to the formulation.
7. Finally, add fragrance to complete the product and store in airtight container.



Fig.7 Manufacturing Process (SELF)



Fig.8. Finished Product

VIII. EVALUATION PARAMETER

The formulated face scrub peel off mask was assessed according to a range of physicochemical and sensory characteristics, including pH, foamability, grittiness, washability, spread ability, and overall sensory attributes. The focus was to ensure that the formulation

is efficient, safe for the skin, and gratifying to use. The observations are outlined below:

Organoleptic Properties

- Colour:

The final product exhibited a light brown tone, which can be assigned to the combination of bioactive compounds used. This tint remained static during storage and use

- Odour:

The formulation possessed a mildly sweet vanilla and herbal fragrance, which was found to be pleasant during application. No foul smell or chemical odors were noticed.

- Texture:

The texture of the product seemed to be smooth and gel-like, with the presence of fine exfoliating particles. It retained its regularity without separation or agglutination.

- Consistency:

The formulation signifies good consistency, neither too runny nor overly thick, making it satisfactory for dual-purpose use (scrubbing and peel-off masking). The product clung tightly to the skin and could be spread evenly.

- Spreadability:

To evaluate spread ability, a shred of the product was interposed between two glass slides and pressurized. The time taken and area covered were noted.

The formulation was turned out to be easily spreadable, signifying optimal viscosity and effortless application.

- pH:

The pH of the product was measured using a digital pH meter after dissolving 1g of the formulation in 100 ml of demineralized water.

The pH reading was in the order of 4.85 (ideal is 4.5-5.5), which is within the dermatologically tested zone and high affinity with healthy to balanced skin.

- Foamability:

A small amount of product was rubbed onto wet skin with minimal water to evaluate foam formation.

The foaming capacity was modest, which is standard for formulations crafting for mild cleansing and exfoliation with gentler surfactants. This aligns with the intended soothing and moisturizing effect.

▪ **Grittiness:**

The formulation was tested for the presence and distribution of exfoliating particles. On gentle rubbing between the fingers, fine gritty particles were clearly perceptible, contributing effectively to its exfoliating action without causing skin abrasion.

▪ **Washability:**

The product was applied on the skin and allowed to dry partially (as per peel-off mask instructions). It was then rinsed with plain water to assess ease of removal. The formulation demonstrated good washability, with minimal residue left behind. It came off easily upon rinsing, supporting its dual-use nature—easy to scrub and peel.

▪ **Folding Endurance:**

The formulation was applied and folded in the same spot until it broke after drying. The amount of times a film can be folded without breaking is known as folding endurance.

IX. RESULT

The formulation developed in this study was aimed to act as multifunctional topical product merging the exfoliating properties of a scrub with the film-forming and cleansing action of a peel-off mask. The end formulation indicates excellent physical steadiness, even consistency, and suitable sensory characteristic suitable for topical application. The preparation was thoroughly crafted by choosing components that provide not only individual functional advantage but also synergistic performance when combined. Each element was selected to assist the inclusive goal of the product exfoliation, film-forming action, skin hydration, and soothing.

The core of the formulation is purified water, which acts as the base liquid, alleviating the uniform dispersion of all aquaphilic ingredients and maintaining a smooth, spreadable viscosity. This aqueous base ensures that the formulation remains non-greasy and lightweight, attributes are highly prudent in rinse-off and peel-off topical applications. The peel-off method is enabled by a bi-polymer system containing polyvinyl alcohol and polyvinylpyrrolidone. These polymers are familiar for their excellent film-forming properties. Their incorporation provides sturdiness to the dried layer,

enabling the mask to be removed as a cohesive film. This not only supports in lifting away impurities and dead skin cells but also enhances user satisfaction through smooth removal.

To deliver mechanical shedding, the formulation contains poppy seeds and tamarind peel powder, both are natural exfoliants rich in antioxidants. These particles provide moderate abrasion that helps shed off dead skin cells, promoting cell rejuvenation and enhance skin texture without causing irritation. Furthermore, sandalwood powder, esteemed in traditional skincare for its anti-inflammatory and soothing properties, affixes a calming element, reducing the probability of redness or sensitivity after application.

Moisturizing is a fundamental part of any exfoliating or peel-off care to prevent skin dryness or tightness. For this intent, glycerine was embodied as a potent humectant, facilitating in moisture retention during and after treatment. The texture and thickness of the formulation were elevated using natural thickeners like tragacanth gum and guar gum, which contributed to get the gel-like texture of the mask.

To retain the bacteriological integrity of the formulation, phenoxyethanol was employed. This broad range preservative is effective towards a wide variety of pathogens and is generally recognized for cosmetic owing to its stability and low irritancy potential. Ultimately, aromatic oil was incorporated in a carefully sedate concentration to provide a delicate, refreshing aroma.

The finished product exhibited splendid physical stability, with no phase separation or microorganism proliferation observed over the testing period. The color, consistency, and fragrance of the formulation stayed the same, signifying the stability of active and supportive ingredients.

When applying, the formulation spread smoothly by the skin surface and dried within an sufficient time frame, forming a uniform film that could be peeled off easily in one piece. The incorporation of exfoliants added a mild scrubbing sensation during application, while the film formation aided in removing superficial dead cells and impurities.

Primary user feedback and sensory evaluation proposed that the formulation left the skin feeling soft, clean, and refreshed, without causing dryness or irritation. The merged action of exfoliation and film-

peeling gave dual cosmetic benefits, making the formulation a decent multifunctional skincare product.

X. COMPARATIVE STUDY:

Parameters	Scrub plus peel-off mask	Marketed peel off mask
Colour	Light brown	Orange
Smell	Sweet vanilla	Strong orange
Texture	Smooth, gel like with scrubbing particles	Smooth gel like
Spread ability	6.2cm	7.5cm
Foamability	No foam	No foam
Grittiness	Exfoliating particles present	No exfoliating particles
washability	good	good
C	4.84	6.85
Folding Endurance	200-300	200-300

The scrub plus peel-off mask stands out with its ideal PH balance, exfoliating particles, and pleasant vanilla scent, offering both skincare and sensory benefits. unlike the marketed product, it gently exfoliates while maintaining skin-friendly acidity, making it a smarter choice for use

Visual Analysis of Formulations

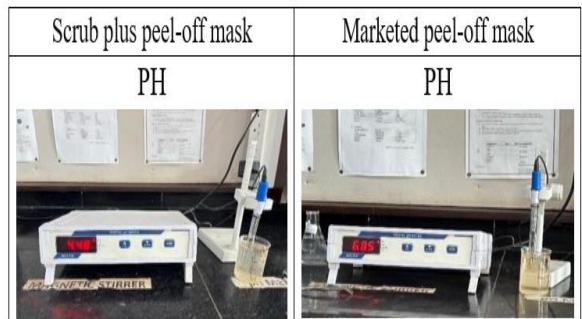


Fig. 9 PH Test

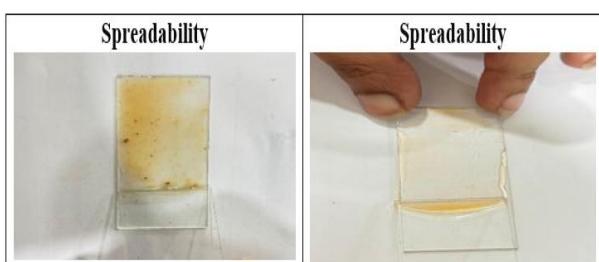


Fig. 10 Spread ability Test



Fig. 11 Texture Test

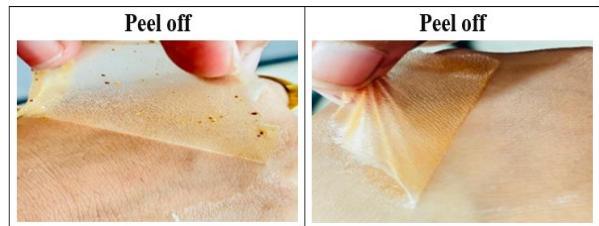


Fig. 11 Peel Off Test

XI. FUTURE PERSPECTIVE

This research concretes the path for the expansion of multipurpose skincare blend using organic and marginal synthetic constituents. The success of Batch F1 highlights the importance of optimizing ingredient ratios for stability, spreadability, and user acceptability.

For future work, the formulation could be extended by:

- Incorporating active botanicals for added benefits like anti-acne.
- Testing long-term stability under various environmental conditions.
- Packaging innovations to extend shelf life without added preservatives & exploring biodegradable packaging to enhance sustainability.
- Pathogen detection and shelf-life inspect to assist economic sustainability.
- Further clinical testing on a larger group can also validate the safety and efficacy of the product for different skin types.

XII. CONCLUSION

The recent study focusing on the development of a multipurpose cosmetic formulation that combines the advantages of a mechanical exfoliation and a film-forming peel-off mask into a single, interactive product. The main objective was to invent a product that not only provides visible epidermal detoxification and revitalization property but also supports stability,

safety, and easy to use, making it appropriate for regular skincare applications.

The optimised formulation revealed outstanding physicochemical stability, with no signs of phase splitting, bacterial contamination, or changes in texture, odor, or color in time. The formulation effectively balanced multipurpose categories like exfoliation, hydration, film formation, thickening, and soothing by blending herbal and synthetic ingredients that augmented each other both practically and sensorially.

One of the important emphasises of this formulation is the addition of herbal exfoliants such as poppy seed and tamarind peel powder. These materials delivered a mild abradant process that supported in eliminating petrified skin cells and declogging the pores without damaging or causing irritation. Unlike rough exfoliators, the particle size and naturally derived of these purifying agents made the formulation appropriate even for delicate skin types when used at the recommended concentration.

The incorporation of polyvinyl alcohol and polyvinylpyrrolidone provided a reliable film-forming base. This bi-polymer system assisted consistent film development over the skin surface over drying. The mask could be peeled off smoothly in one layer, competently lifting away dirt, excess oil, and slackened dead cells.

For ideal texture, natural thickeners are incorporated such as tragacanth gum and guar gum which provides a gel like viscosity that spreads evenly and smoothly without soaking or clumping. Phenoxyethanol was incorporated as a preservative to assure pathogenic safety of the formulation during the products durability.

At last, the formulation portrays an innovative approach in skincare formulation development which effectively combines the exfoliating, hydrating and film-forming functions of the product. It provides an effective method for purification and to enhancing skin texture. which could attract to a large consumer base looking for suitable yet result oriented skincare solutions. The stability, safety, and multipurpose outline of this formulation make it a optimistic commercial production in the cosmetic industry, especially within the emerging market for herbal and multifunctional skincare products.

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