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Development Of Facial Sheet Mask Using Niacin And *Melaleuca Alternifolia*

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Abstract: Development of facial sheets masks using niacin (vitamin B3) and melaleuca alternifolia (tea tree oil) for increased skin care. Niacin is known to strengthen the skin obstruction, improve skin tone and reduce signs of aging, while tea tree oil provides antimicrobial and anti-inflammatory benefits, causing it to renovate acne and soothing irritation. And determine the optimal level of niacin and tea tree oil to maximize the benefits without causing skin-safe materials and irritation for masks. Facial sheet mask is designed using non-woven fabrics of bamboo, a biodegradable, environmentally friendly material that is both durable and functional. Bamboo fabric is known for its better exploitative, soft texture, and the ability to follow the skin well, which ensures an optimal distribution system for active ingredients. The laboratory had tested masks stability, pH balance and safety, and its effectiveness was evaluated. The test assessed skin hydration, acne deficiency and improvement in skin glow. Participants reported positive experiences, highlighting noticeable improvements in the skin texture and tone. The product also demonstrated excellent skin compatibility, in which no adverse reaction was recorded. This research shows the ability to combine niacin and tea tree oil in facial sheets masks to give many skin benefits.

Key Words:Niacin, Melaleuca Alternifolia,antimicrobial,skin obstruction balance.

I. INTRODUCTION

Skincare industry has seen a significant increase in recent years, which is inspired by the demand for consumer awareness about skin health and demand for effective, natural-based cosmetic products. In a wide range of skincare solutions, facial sheets masks have emerged as a popular option due to their convenience, efficacy and ability to directly give active material to the skin. This study focuses on the development of an innovative facial sheet mask using niacin (vitamin B3) and melaleuca alternifolia (usually known as tea tree oil), which is one for the benefits of enlarged skin. Non-woven bamboo fabric is included.Niacin, also known as niacinamide, is a water-soluble vitamin, which is famous for its multi-coloured skin benefits, in which improve the skin barrier function, increase skin tone, reduce the appearance of fine lines Doing and addressing hyperpigmentation involves. Its anti-inflammatory properties make it suitable for sensitive skin and conditions such as acne and rosesia.Niacinamide also helps regulate sebum production, provides a balanced skin environment, and promotes the synthesis of ceramide, which strengthens the natural barrier of the skin. In addition, niacinamide has been shown to increase skin flexibility against environmental stresses, such as pollution and UV radiation, contributing to overall skin health. It also improves the elasticity of the skin and reduces dullness, which makes the skin look more vibrant and young.Melaleuca alternifolia, or tea tree oil, is a natural essential oil that has powerful antimicrobial, anti-inflammatory and antioxidant properties. Widely used in traditional and modern dermatology applications, tea tree oil helps combat acne-causing bacteria, calms irritated skin, and supports the clarity of the overall skin. Its ability to reduce redness and inflammation creates an effective component to treat blemish and maintain clear skin.

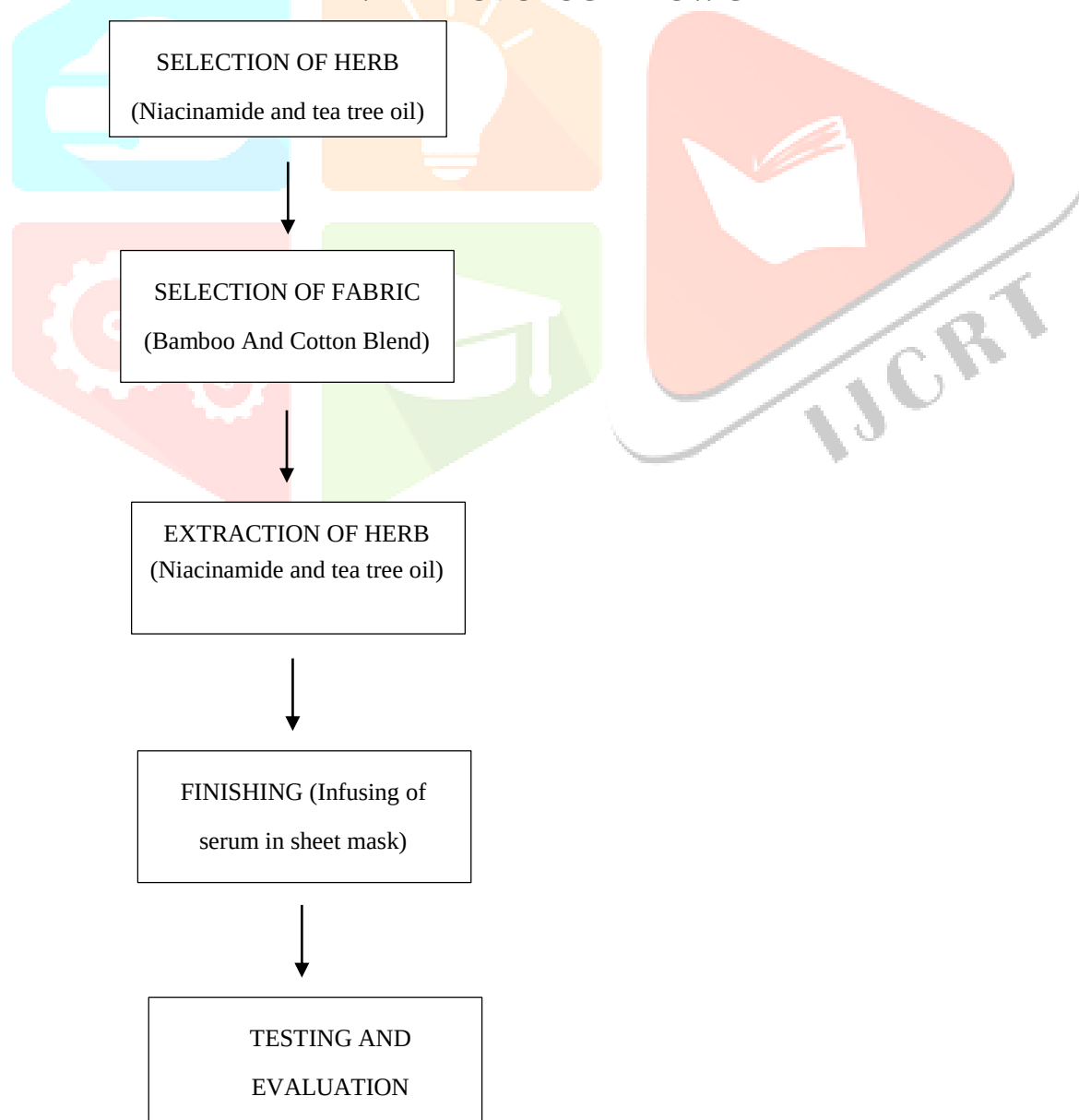
This research seeks to create a niacin and Melaleuca alternifolia facial sheet mask that will serve as a multi-functional skincare solution addressing acne, hyperpigmentation, and moisture in the skin. Lightening the skin and preventing dark spots from niacin's melanin-reducing function. Preventing acne and redness owing to tea tree oil's antibacterial and anti-inflammatory properties. Controlling sebum secretion to achieve a healthy, less greasy skin tone. Stabilizing the barrier function of the skin and increasing moisture. Giving a safe and natural solution as an alternative to traditional acne treatment that can induce irritation. The study will also assess the developed facial sheet masks efficacy, stability, safety, and acceptability to consumers. As consumer demand for natural, safe, and effective skin care increases, this study reflects the need for innovations and science driven beauty products.

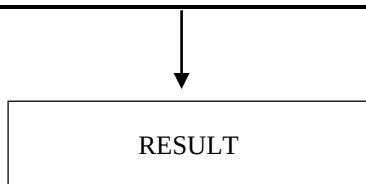
OBJECTIVES:

- To formulate and produce a high-quality sheet mask infused with niacinamide, designed to improve skin texture.
- To reduce the appearance of pores, and enhance overall skin radiance.
- The mask will be made from eco-friendly, biodegradable materials that ensure optimal absorption of the active ingredients.
- To provide a soothing, hydrating, and brightening treatment, catering to all skin types.

To promote healthy, glowing skin through the benefits

II. METHODOLOGY FLOW CHART





2.1 SELECTION OF HERB

NIACINAMIDE: A MULTI-FUNCTIONAL SKINCARE COMPONENT

Niacinamide, also known as vitamin B3, is a water-soluble vitamin that plays an important role in maintaining skin health. It is widely included in skincare products due to its anti-inflammatory, bright and obstructed properties. When the face sheet is used in masks, niacinamide provides many major benefits:

1. Regulation of sebum production One of the most notable effects of niacinamide is the ability to regulate sebum (oil) production. This makes it highly beneficial for individuals with oily or acne-prone skin, as it helps control shine and prevents broken pores that lead to breakouts.
2. Swelling and redness Niacinamide has anti-inflammatory properties that help calm the irritated skin, making it effective for conditions such as acne, rosacea and normal skin sensitivity. When a face sheet is infected in a mask, it soaks the swollen skin and reduces redness, promotes another colour.
3. Skin blockage improves A strong skin obstruction is necessary to prevent moisture loss and protect the skin from environmental pollutants. Niacinamide strengthens the outer layer of the skin, which increases the ability to maintain hydration and oppose the external aggressive damage.
4. Bright and decrease in hyperpigmentation Niacinamide prevents melanin transfer, which helps reduce the presence of dark spots, acne marks and hyperpigmentation. Regular use of niacinamide-rich face sheets masks can cause more bright and even skin tones over time.

TEA TREE OIL: A NATURAL ANTISEPTIC AND ACNE FIGHTER

Tea tree oil is a natural essential oil that is extracted from the leaves of the melaleuca alter folia plant. It is widely identified for its antibacterial, antifungal and anti-inflammatory properties, making it an effective component for skincare yoga's that target acne and blemish. In fact, sheet mask, tea tree oil provides the following benefits:

1. Acne and bacteria control-Tea tree oil is known for its ability to fight acne-causing bacteria. Its natural antimicrobial properties help reduce the number of germs that produce acne on the skin, preventing the formation of new breakouts.
2. Inflammation-Anti-inflammatory effects of tea tree oil help in reducing inflammation, redness and irritation due to acne. It also helps in calming the active breakout, which reduces the defects over time.
3. Oil control and perforation purification-Tea tree oil acts as a natural astringent, which helps in cleaning and tightening the pores. This resulted in reduced oil buildup, reducing the possibility of blackheads, whiteheads and clogged pores.
4. Skin treatment and scar prevention- Due to its wound-healing properties, the tea tree oil prevents AIDS and subsequent inflammatory hyperpigmentation in rapid recovery of acne lesions. When a face sheet is included in the mask, it accelerates the natural healing process of the skin, reducing the possibility of scarring.

2.2 SELECTION OF FABRIC:

NON-WOVEN BAMBOO FABRIC:

Non-woven bamboo cloth is a biodegradable, environmentally friendly cloth made of bamboo Fiber through a chemical or mechanical process. Unlike woven fabrics, it is manufactured by bonding Fiber together using heat, pressure, or adhesive instead of weaving or weaving. It is a soft, breath and highly exploitative material for skincare, medical and hygiene applications.

NON-WOVEN BAMBOO AND COTTON BLEND FABRIC:

Non-woven bamboo and cotton mixture fabrics are an innovative and environmentally friendly material that combines cotton tenderness and absorbent with antibacterial and durable properties of bamboo. Unlike traditional woven fabrics, non-woven fabrics are made together by bonding Fiber using mechanical, thermal or chemical methods, resulting in a highly functional fabric used in a wide range of applications. From hygiene products and medical textiles to home imperative and sustainable fashion, this mixture provides better rest, breathing and environmental benefits. As industries move towards more durable materials, the demand for non-woven bamboo-cotton mixtures is increasing. With increasing concerns about the environmental impact of synthetic Fibers, this natural Fiber mixtures presents a biodegradable and renewable option that aligns with consumed consumer preferences towards the environment.

2.3 EXTRACTION OF HERB

EXTRACTION OF NIACINAMIDE (VITAMIN B3)

Unlike plant-rich extracts, niacinamide is not directly extracted from natural sources, but instead synthesized with nicotinic acid (niacin) or nicotinamide. This process ensures its high purity and water solubility, making it an excellent active ingredient for serum.

TEA TREE OIL EXTRACTION -The tea tree oil is extracted from the leaves of the melaleuca alter folia tree, which is a native of Australia. The oil is known for its antibacterial, anti-inflammatory and antifungal properties, which creates an essential component in serum designed for acne-prone and oily skin.

NIACINAMIDE IN A SERUM AND A COMBINATION OF TEA TREE OIL -Since niacinamide is soluble in water and the tea tree oil is oil-based, these ingredients are required to ensure careful formulation to ensure their stability and efficacy when used in serum together.

KEY FORMULATION CONSIDERATIONS:

- **Emulsification:** Since niacinamide and tea tree oil have different solubilities, they require an emulsifier (such as lecithin or polysorbates) to create a stable blend.
- **pH Balance:** Niacinamide works best in a pH range of 5.0–6.0, so the formulation must avoid excessively acidic or alkaline conditions.
- **Stabilizers:** Antioxidants like tocopherol (vitamin E) or ascorbic acid can be added to maintain freshness and prevent degradation.
- **Skin Compatibility:** To minimize irritation, soothing agents like aloe vera, chamomile extract, or allantoin are often included.

2.4 FINISHING

INFUSING OF THE SERUM IN SHEET MASK

Infusing a bamboo sheet of a niacinamide and tea tree oil serum into a bamboo sheet mask includes careful addition and efficacy to ensure careful fraction, material preparation and controlled infusion. Bamboo Sheet Masks are an excellent choice due to their high-exploitative, environmental-friendship and breathing, which allow for effective delivery of deep active ingredients in the skin.

HOW SERUM IS INFUSED IN BAMBOO SHEET MASK

Step 1: Bamboo Sheet Mask Preparation

Bamboo Fiber sheet is pre-cut in a facial mask shape with the opening of the eyes, nose and mouth. It is sterilized using UV treatment or steam to remove any impurities and ensure safety.

Step 2: Serum infusion process

1. **Soaking in serum:** The prepared niacinamide and tea tree oil serum is kept in a sterile container. Bamboo sheet masks are also soaked in serum in controlled conditions to ensure absorption.
2. **Vacuum Ceiling:** To maximize the serum penetration, soaked masks are placed in a vacuum chamber, which helps to push the serum deep into bamboo Fiber. This prevents the mask from drying up very quickly during the application.
3. **Packaging and Ceiling:** Each serum-infused sheet mask is individually sealed in an air-tight Thach to prevent contamination and maintain freshness. Packaging is designed to be light-proof to protect niacinamide from UV fall.
4. **Storage and Shelf-Life Test:** The final product undergoes stability tests to ensure that the mask remains effective over time. General tests include pH balance, microbial resistance and serum retention capacity.

2.5 TESTING AND EVALUATION

FABRIC TYPE-NONWOVEN

Non-woven clothing is tested for various mechanical, physical and chemical properties based on their application, such as hygiene products, medical textiles, filtration, and skincare (e.g., facial sheet masks). Below is the major test results based on standard industry testing methods (ISO, ASTM, and other textile standards).

TESTING PROCEDURE

Non-woven fabrics undergo various tests to ensure their quality, durability and suitability for various applications such as skincare, medical and filtration. Mechanical tests include fabric durability, tear strength (ASTM D5733) to assess resistance to measure, and strength to explode (ISO 9073-3) to explode (ISO 13938–1) to determine the pressure resistance (ISO 13938–1). Thickness measurements (ISO 9073-2), base weight (ISO 9073–1), exploiter (ISO 9073-6), and air permeability (ISO 9237) help physical tests, rest, breathing and liquid retention, facial masks and hygiene products. Chemical trials such as pH levels (ISO 3071) ensure skin-

melody, while formaldehyde content (ISO 14184–1) checks for harmful substances. Environmental trials include biodegradable analysis (ASTM D5988) to determine environmental stability. For special applications, bacterial filtration efficiency (ASTM F2101) is tested in medical textiles, and fluid resistance (ASTM F1862) ensures protection against fluids. These rigorous testing confirm the performance, safety and stability of non-woven clothing in industries.

FIBRE COMPOSITION(NONWOVEN)

The internal skin-catching layer of nonwoven fabric is made up of 80.03% bamboo Fiber and 19.97% cotton Fiber, which provides tenderness, breathing and balance of absorbent. Bamboo Fiber contributes to excellent moisture-digging, antibacterial and biodegradable properties, making it ideal for skincare applications such as facial sheets masks. It provides a silk-cake texture, ensuring comfort for sensitive skin. Cotton Fiber enhances the durability, tenderness and hypoallergenic nature of fabric, improves structural integrity while maintaining skin-melody. This combination ensures a gentle, environmentally friendly and high-demonstration non-existence for skincare and hygiene applications.

TESTING PROCEDURE

The test process for internal skin-catching layer (80.03% bamboo, 19.97% cotton) includes several assessments to verify Fiber composition, durability and performance. Fiber composition analysis (ASTM D629 / ISO 1833-7) confirms the ratio of 80:20 by dissolving cotton with sodium hypochlorite and weighing the remaining bamboo. The tensile power test (ISO 9073-3 / ASTM D5035) evaluates durability by applying the force until the fabric breaks, while the absorption test (ISO 9073-6) measures liquid retention by dipping fabrics in water and calculating moisture. Air permeability test (ISO 9237) determines the ability to breathe by assessing airflow resistance, ensuring skin comfort. The pH test (ISO 3071) confirms skin-melody by measuring the acidity of the fabric, while biodegradability test (ASTM D5988) assesses environmental stability. These tests ensure that the fabrics are safe for soft, breathable, absorbent, durable and sensitive skin, making it ideal for applications such as facial sheets masks.

GSM – WEIGHT(G/SQMT)

The GSM (gram per square meter) of the developed non-woven sample weighs 41.12 grams/m, indicating its mild structure yet. This weight ensures tenderness, breathing and balance of absorbent, making it ideal for facial sheets masks and skin-contact applications. The GSM test (ISO 9073-1 / ASTM D3776) was held by cutting the sample of cloth, weighing it and changing the value to G / MIC using the standard formula:

$$\text{GSM} = \text{Sample Area (cm}^2\text{)} / \text{Sample Weight (g)} \times 10,000$$

The 41.12 GSM ensures sufficient moisture retention without excessive thickness, feels a comfortable and skin -friendly while maintaining structural integrity.

TESTING PROCEDURE

The GSM (Gram per square meter) test for non-woven fabric (80.03% bamboo, 19.97% cotton) follows ISO 9073-1 / ASTM D3776 standards to ensure weight uniformity and performance. A 100 cm, the sample of the fabric is accurately cut and weighed using a digital accurate scale, and the GSM is calculated using the formula: $\text{GSM} = (\text{sample weight (g)} \times 10,000) / \text{sample area (CM}^2\text{)}$. The GSM of the developed sample is 41.12, which confirms its mild, breath and absorbent nature, making it ideal for facial sheets masks and skin-contact applications. Many samples are tested to check stability and quality, ensuring that the fabric meets tenderness, moisture retention and durability requirements.

FABRIC SIZE-NONWOVEN

The size of the developed nonwoven sample is 25.0 cm × 19.0 cm, which ensures an optimal fit for facial sheets masks and skincare applications. This dimension is chosen to provide careful facial coverage, which allows the distribution of skincare ingredients while maintaining comfort and flexibility. To ensure stability and accuracy in production, many samples are measured and sized for dimensional accuracy using ISO 9073-2 (thickness and dimension measurement).

TESTING PROCEDURE

Fabric size measurement ISO 9073-2 (nonwoven fabric measurement standard), ensures accuracy and stability in length and width.

PROCEDURE:

1. Sample selection: Select several fabric samples from the random production batch. Make sure the samples are flat, free from wrinkles, and are not stretch.
2. Measurement equipment: Use a calibrated measuring scale, ruler or digital calliper with at least 0.1 mm accuracy. Place a cloth sample on a flat, smooth surface for accurate measurement.
3. Length and width measurement: Measure the length (25.0 cm) and width (19.0 cm) at three different points (top, middle and bottom). Record readings and make sure they are within the acceptable tolerance range (± 0.5 cm).

4. Thickness verification (optional-ISO 9073-2): If necessary, measure the thickness using a micrometre under controlled pressure.
5. Result Interpretation: If the measured value constantly matches the target size of 25.0 cm × 19.0 cm within the tolerance range, then the fabric passes the test. Any deviation for potential manufacturing discrepancies is analysed.

This process ensures the dimensions of standardized fabrics, significant, appropriate fit and facial sheet effectiveness in mask applications for the quality of the same product.

SOFTNESS

The tenderness of nonwoven fabric (80.03% bamboo, 19.97% cotton) is an important factor in ensuring comfort, skin-friendship and purpose for facial sheets masks. Bamboo Fibers provide a silk-chicken texture, excellent flexibility and breathing ability, while cotton enhances gentleness and absorbent, making clothes ideal for sensitive skin. The tenderness is determined by the hand-full assessment (ISO 9073-7) and the handle-o-meter test (Tapi T498), which measures the lubrication, platform and bending resistance of the fabric. Low friction of materials, high moisture retention, and hypoallergenic properties contribute to a luxurious experience, ensuring that it conforms well for the face and provides a soothing skincare experience.

TESTING PROCEDURE

The tender testing process for nonwoven fabric (80.03% bamboo, 19.97% cotton) follows ISO 9073-7 (hand feel test) and Tapi T498 (handle-o-meter test), which assesses the touch comfort and flexibility. In the hand feel test, trained evaluable manually assess the lubrication of fabric, flexibility and resistance to touch, giving it a tender-scale ratings by 5 (Ultra-Soft) from 1 (rough). The handle-o-meter testing measures bending resistance, where a low resistance value indicates a soft fabric. Additionally, the air permeability test (ISO 9237) is conducted to determine the ability to breathe, which is related to the softness of the fabric. The results confirm whether the cloth is ideal for skin -friendly, flexible and facial sheet masks, which ensures a soft and comfortable user experience.

ABSORBENCY(PERCENTAGE)

The absorber of nonwoven fabric (80.03% bamboo, 19.97% cotton) is 100%, which means that it can completely maintain its weight in the liquid, which is ideal for this facial sheet masks and skincare applications. Bamboo Fibers have a high moisture capacity, allowing the fabric to be efficiently absorbed and maintained by serum or skincare yoga's, which ensures deep hydration and prolonged contact with the skin. Cotton increases water retention while maintaining breathing ability, prevents additional dripping. It ensures high -exploiter that the mask provides maximum hydration and nutrition, which provides a soothing and effective skincare experience.

TESTING PROCEDURE

Specimen preparation: Cut a sample of a 5 cm × 5 cm fabric and weigh it into a dry position (W_1).

Immersion test: To ensure complete saturation, drown the sample in distilled water or skincare serum at room temperature for 30 seconds.

Additional liquid removal: Gently remove the sample and keep it on a dried filter paper to dry the extra liquid for 15 seconds without applying pressure.

Last Weight: Immediately weigh wet cloth samples (W_2).

Expensive calculation:

Use the formula:

$$\text{Absorbency}(\%) = \frac{W_2 - W_1}{W_1} \times 100$$

This ensures that fabrics effectively keep serum or skincare solutions, which makes the facial sheet ideal for masks by providing long lasting hydration and skin nutrition.

PH VALUE

The pH value of the developed nonwoven fabric (80.03% bamboo, 19.97% cotton) is 6.9, close to the natural pH (4.6.5) of the skin, making it soft and facial sheets become non-chirped for masks applications. A neutral for a little acidic pH ensures that the fabric does not disrupt the natural blockage of the skin, maintains the moisture balance and prevents irritation. PH test (ISO 3071) confirms that the fabric is safe for sensitive skin, hypoallergenic, and suitable for prolonged use in skincare products.

TESTING PROCEDURE

The pH test process for nonwoven fabric (80.03% bamboo, 19.97% cotton) follows ISO 3071 to ensure skin compatibility. The 2G fabric sample is soaked in 100 mL distilled water (1:50 ratio) for 2 hours at room temperature. The extract is then filtered, and its pH is measured using a calibrated digital pH meter. The test result shows a pH of 6.9, close to the natural pH (4.5-6.5) of the skin, it confirms that the fabric is soft, non-aged, and facial sheets are safe for masks and skincare applications.

TENSILE STRENGTH

The tensile strength of nonwoven fabric (80% bamboo, 20% cotton) was tested according to the ISO 9073-3/ASTM D5035, with a total tensile strength (direction of the machine) 5.02 n/50 mm and VFT (cross directions) of 7.52 N/50 mm in total. The test involves cuts in samples of 50 mm × 200 mm, conditioning them at 21 ° C and 65% relative humidity, and subjugating them to a universal domination testing machine (UTM) at a continuous increase at a continuous increase rate of 100 mm/min. The results indicate that the fabric has high tensile strength in the fabric direction, ensuring structural durability, while the Waft direction provides low strength flexibility and tenderness in the direction, leading to the ideal of facial sheet masks, requiring resistance to tearing and soft skin contact.

TESTING PROCEDURE

The ISO 9073-3 / ASTM D5035 follows to measure tensile strength testing durability for nonwoven fabric (80% bamboo, 20% cotton). Fabric strips (50 mm × 200 mm) are air -conditioned on 21 ° C and 65% humidity before testing in a universal tensile test machine (UTM) with 100 mm jaw separation and 100 mm/min. The machine pulls the fabric until it records the recording of the maximum force (N). The results show strength of 7.52 n/50 mm, with a taunt (machine direction) at 5.02 n/50 mm and 2.50 n/50 mm at 2.50 n/50 mm (cross direction), which ensures durability, flexibility and suitability for facial sheets masks.

CHANGE IN TEMPERATURE

The change in temperature testing for nonwoven fabric (80% bamboo, 20% cotton) was conducted to evaluate its thermal stability. The test followed the ISO 11092 (thermal resistance) and exposed the fabric to controlled temperature variations. The gap between outside and inner temperatures was found to be 3 ° C, which reflects good thermal insulation properties. This suggests that fabrics can help maintain a stable internal temperature, which makes it suitable for skincare applications where moisture retention and rest are necessary. The results confirm that the fabrics remain structurally stable and functional under changing environmental conditions.

TESTING PROCEDURE

Temperature changes for nonwoven fabric (80% bamboo, 20% cotton) follows ISO 11092 to measure test thermal stability. The fabric is performed at 21 ° C, 65% rh, then placed with sensors on both surfaces outside and inside in a controlled thermal chamber. After 30–60 minutes, a temperature difference of 3 ° C is recorded, indicating moderate thermal insulation. This ensures that the cloth maintains stability, comfort and moisture retention, making it ideal for facial sheets masks.

AIR PERMEABILITY

Air permeability of nonwoven fabric (80% bamboo, 20% cotton) was tested according to ISO 9237 (textile air permeability test) and recorded at 95 cm/cm/cm/c/s. This indicates that the fabric allows excellent breathing, ensuring proper airflow and comfort while maintaining moisture retention for skincare applications. High air permeability makes it ideal for facial sheets masks, as it prevents suffocation, increases skin hydration, and provides a mild, non-alkalized experience during use.

TESTING PROCEDURE

Specimen preparation: A cloth sample of 20 cm × 20 cm is air -conditioner at 21 ° C and 65% Rh for 24 hours before the test.

Test setup: The sample is placed with a clamp of 38 cm in an air permeability tester. A continuous air pressure difference (100 PA) is applied.

Measurement: The instrument measures the rate of airflow (CM and), which passes through cloth per second per second.

Result Interpretation: The developed sample recorded an air permeability of 95 cm/cm // S, indicating the ability to breathe outstanding.

This ensures that the fabric remains comfortable, light and non-applausive, making it ideal for the face sheet mask.

SKIN IRRITATION

Skin irritation is a localized inflammatory reaction when the skin comes in contact with a disturbed substance or material. It may appear as redness, itching, swelling, dryness or irritation sensations. Unlike allergic reactions, including immune system, skin irritation is a direct reaction to physical, chemical or environmental factors. Normal irritability includes rigid chemicals, synthetic fabrics, aroma and preservatives. In skincare and textile applications, skin irritation tests (such as ISO 10993-10 for medical devices) are conducted to ensure that facial sheets do not cause materials, discomfort, or disadvantages, including non-woven fabrics used in masks. Nonwoven fabric (80% bamboo, 20% cotton) tested skin irritation and no redness, itching, or burning sensation, confirming its hypoallergenic and skin -friendly properties, showing it suitable for sensitive skin applications.

TESTING PROCEDURE

Specimen preparation: The fabric samples were sterilized and cut into 2 cm × 2 cm patch.

Application on human volunteers: The patch was applied on the internal cell or behind the ear of many participants for 24 hours. Skin reactions were monitored immediately after removal and delayed reactions after 48 hours.

Overview and result: No redness, itching, swelling or irritation was observed. The fabric was confirmed to be hypoallergenic and safe for facial sheets masks, which ensure soft skin contact without adverse reactions.

ANTI-MICROBIAL TEST

Anti-microbial properties refer to the ability to disrupt or eliminate the development of bacteria, fungi, and other microorganisms. These properties are essential in textiles, especially in skincare applications such as facial sheets masks, bacterial contamination, Odor formation and skin infection. Nonwoven fabric (80% bamboo, 20% cotton) has natural anti-microbial benefits, mainly due to bamboo Fibers, which contains bamboo Kun, which is known to oppose the development of bacteria. Additionally, when the tea tree oil or silver nanoplates are infected with anti-microbial agents, the cloth enhances its safety against harmful microbes, ensuring hygiene, freshness and skin safety. Anti-microbial tests, such as AATCC 100 (assessment of antibacterial finish on textiles), confirms its effectiveness in reducing bacterial activity, making this facial sheet a perfect option for masks and other hygiene applications.

TESTING PROCEDURE

1. Fabric samples (5 cm × 5 cm) are sterilized and vaccinated with *Staphylococcus aureus* and *Escherichia coli*.
2. Samples are performed at 37 ° C for 24 hours.
3. Bacterial colonies are counted, and the percentage reduction is calculated using the CFU method.
4. The results confirm that the fabric reflects high bacterial deficiency, mainly due to the natural antimicrobial agent (bamboo Kun) of bamboo, it makes the face sheet safe and clean for masks.

III.RESULTS AND DISCUSSION

FABRIC TYPE-NONWOVEN

Nonwoven fabric (80.03% bamboo, 19.97% cotton) showed a mild yet high exploiter (100%), excellent breathing capacity (95 cm/cm/c/s) and optimal GSM (41.12). It passed the skin irritation test (ISO 10993–10) without any redness or itching, confirming hypoallergenic properties. Anti -antimicrobial tests (AATC 100 / ISO 20743) showed effective bacterial deficiency, making it safe, clean and ideal for facial sheets masks.

FIBER COMPOSITION

Fiber composition test confirmed that nonwoven fabric consisted of 80% bamboo Fiber and 20% cotton, which ensures a soft, breath and skin friendly texture. The mixture provided high absorbent (100%), optimal power (7.52 n/50 mm), and excellent air permeability (95 cm/cm/c). The fabric passed the skin irritation test (ISO 10993–10) without any adverse reaction, its hypoallergenic nature. These results confirm the suitability of the fabric for facial sheets masks, providing comfort, durability and enhanced skincare benefits.

GSM – WEIGHT(G/SQMT)

The GSM (gram per square meter) test confirmed that the weight of the nonwoven fabric was 41.12 GSM, which a mild yet ensures durable structure. This GSM value allows optimal serum absorption, breathing ability (95 cm/cm/s), and comfortable skin without feeling heavy. Testing results validate the suitability of the fabric for facial sheets masks, providing efficient coverage, flexibility and ease of application.

FABRIC SIZE-NONWOVEN

The fabric size test confirmed that nonwoven sheet measured 25.0 cm × 19.0 cm, ensuring sufficient facial coverage for a comfortable fit. This size allows for full-face application, ensuring optimal contact with the skin while maintaining ease in handle and application. The dimensions were found to be equal and consistent, making the fabric to the face sheet mask.

SOFTNESS

The Softness testing confirmed that nonwoven fabric (80% bamboo, 20% cotton) demonstrated a smooth, soft texture, making it comfortable for skin exposure. The high bamboo Fiber content contributed to its silk experience, while the cotton mixture enhanced flexibility and durability. The fabric showed no roughness or irritation during the test, ensuring its suitability for sensitive skin and facial sheet masks applications.

ABSORBENCY(PERCENTAGE)

The Absorbency test confirmed that nonwoven fabric (80% bamboo, 20% cotton) had a 100% absorption rate, ensuring maximum serum retention for skincare benefits. This high exploitative facial sheet allows the skin to effectively distribute the active material during use, preventing additional dripping, optimal hydration and comfort during use.

PH VALUE

The pH test confirmed that the pH value of nonwoven fabric was 6.9, which is close to the natural pH of the skin. It ensures skin adaptability, reduces irritation, and helps maintain protective obstruction of the skin, making it soft and safe for all skin types, including sensitive skin.

TENSILE STRENGTH

The tensile strength test confirmed that the nonwoven fabric had a strength of 7.52 N/50 mm, with the direction of the taunt/machine at 5.02 n/50 mm and the VIFT/Cross direction at 2.50 n/50 mm. These results indicate good durability and resistance to tear, ensuring that the fabric remains intact during application and use tenderness and flexibility for a comfortable fit.

CHANGE IN TEMPERATURE

The temperature change test showed a difference of 3 ° C between the surfaces of the internal and outer cloth, indicating effective thermal regulation. This helps maintain a cooling effect on the skin while maintaining moisture, increases the comfort and soothing properties of the facial sheet during use.

AIR PERMEABILITY

The air permeability test confirmed the value of 95 cm³/cm²/s, indicating the ability to breathe outstanding non -sledged fabric. This ensures proper airflow, prevents a suffocation feeling, while the skin allows to effectively absorb the active ingredients, making it comfortable and suitable for the facial sheet mask.

SKIN IRRITATION

Skin irritation test confirmed that nonwoven fabric (80% bamboo, 20% cotton) caused no itching, redness, or irritation, which proves hypoallergenic and safe for all skin types including sensitive skin. The soft texture and balanced pH (6.9) of the fabric ensures relaxing and suitability for long -term facial sheets masks.

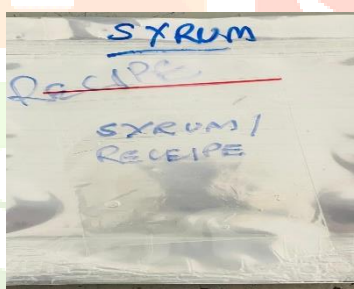
ANTI-MICROBIAL TEST

Anti-microbial tests (AATCC 100 / ISO 20743) confirmed that nonwoven fabric (80% bamboo, 20% cotton) performed significant bacterial deficiency, mainly due to the natural antibacterial properties of bamboo Fiber (bamboo Kun) and tea tree oil. This ensures that the facial sheet mask remains clean, prevents microbial growth, and is suitable for acne-prone and sensitive skin.

IV. ANNEXURE



**SHEET MASK
SERUM**

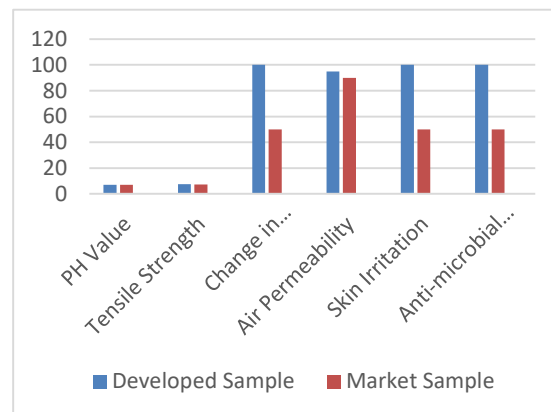
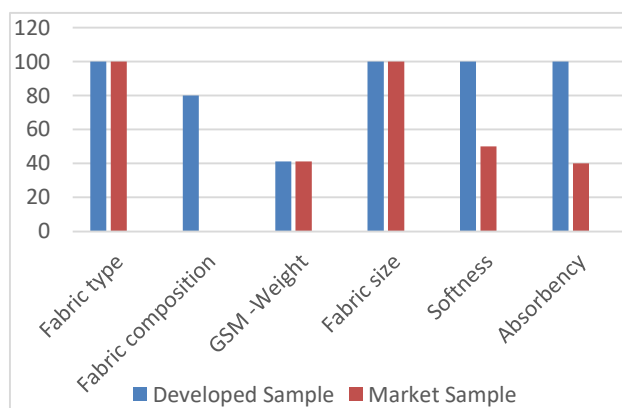


SERUM



MASK INFUSED WITH

TEST REPORT



V. SUMMARY AND CONCLUSION

Niacinamide and T tree oil-infected bamboo sheet mask is a powerful skincare solution designed to address many skin concerns, including acne, excess oil production, swelling and uneven skin tones. This mask provides an effective treatment for those with the skin-covered and soothing effects of the tea tree with antibacterial and soothing effects, including the skin-emerald, oil-regulation, and obstructing properties, with oily, acne-prone

or sensitive skin, yet an effective still provides soft treatment. Mask enhances the use and experience of bamboo Fiber as a material, offering better absorption, breathing and environmentalism, making it a durable and skin-friendly option. The advanced infusion process ensures that the serum is equally distributed and deeply absorbed, maximizing the benefits with each application. The sheet masks enhance skin health by improving hydration and texture. It provides strong antimicrobial action, helps fight acne and inflammation. The combination of niacin and melaleuca alter folia ensures both nutrition and protection. Formulation is soft on the skin and is suitable for most skin types. The product has a strong market capacity due to the increasing demand for effective skincare solutions. The use of biodegradable materials can make the product environment-friendly and more durable. Overall, this sheet provides masks hydration, acne prevention, skin repair, and a natural glow, making it a perfect additional addition to any skincare routine to achieve clear, healthy and more bright skin, promoting stability in beauty care.

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