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DEVELOPMENT OF EYEMASK USING *PINUS-PINASTER AND HIBISCUS ROSA SINENSIS*

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ABSTRACT

Nowadays the sleep cycle of the people was completely affected due to the electronic screen time, physical inactivity, caffeine before bedtime, irregular sleep schedule, light exposure, stress, depression, etc. This results in fatigue and lethargy, bipolar disorder, insomnia, cognitive impairment, premature aging, mood-related disorder, reduced quality of life, increased risk of accidents, weakened immune system, cardiovascular problems, etc. So, the sleep mask is used to improve the sleep cycle of an individual. It increases melatonin secretion, reduces eye strain, and provides relaxation and stress relief. This eyemask made with bamboo fabric is also known for being hypoallergenic in nature and also contains antimicrobial properties in nature that help to reduce the growth of microorganisms. Which produce comfort and breathability result in reduced stress and improved relaxation to the wearer. The ingredients present in the eye mask are hibiscus *(Hibiscus sabdariffa),* maritime pine *(Pinus pinaster),* jojoba oil *(Simmonds chinensis),* and vetiver essential oil *(Chrysopogon zanioides).* The hibiscus *(Hibiscus sabdariffa)* consists of anti-inflammatory properties, which help to reduce eye puffiness; antioxidant properties, which help to prevent the skin from damage; and soothing and calming effects on the skin, which help to reduce stress and result in relaxation, resulting in improved sleep quality. The maritime *pine (Pinus pinaster),* jojoba oil *(Simmonds chinensis),* and vetiver essential oil *(Chrysopogon zizanioides)* are all anti-inflammatory, which aids in reducing eye puffiness and soothing the skin. The maritime pine *(Pinus pinaster)* also contains antiseptic properties, which helps to arrest the eyes from infection. The jojoba oil *(Simmonds chinensis)* consists of moisturizing properties that aid in nourishing the skin. The vetiver essential oil *(Chrysopogon zizanioides)* consists of soothing properties that relieve the skin from stress and result in increased relaxation. While merging these ingredients by the boiling method, that results in eliminating eye puffiness, dark circles, promoting relaxation, eliminating stress, improving skin hydration, and increasing the sleep cycle.

Key words

Eye puffiness, improve sleep cycle, Reduce stress, Skin hydration, *Pinus pinaster*, *Chrysopogon zanioides.*

INTRODUCTION

The eye mask is used as a protective device to protect the eyes from light and aid in improving relaxation and sleep quality. While using an eye mask, it aids in improving sleep quality and relaxation. An eye mask is usually worn around the eyes that help to block the harmful lights and radiation and prevent eyes from improving the healthy natural sleep. While the human sleeps well during the night, it helps to improve the memory and concentration levels, which results in better improvement in their daily life. Nowadays, people understand the importance of eye masks; various brands launched their eye masks in the market. These eye masks have many disadvantages, such as not fitting properly to the wearer, blocking the light, and causing skin irritation and rashes. These eye masks may have the possibility of

many virus activations and are made up of low-quality materials. The eye mask made with herbal ingredients such as hibiscus, pine bark, and jojoba oil have many advantages.

The fabric used in this eye mask is pure bamboo fabric, which is breathable, moisture-wicking, a natural temperature regulator, and soft to the skin. Bamboo fabric has long-lasting properties to hold the herbs and is antimicrobial in nature, which helps to prevent the growth of microorganisms. It helps to improve sleep quality, relaxation, comfort, and hygiene in nature. It is a sustainable and eco-friendly fabric that helps to reduce the textile waste.

The pine bark *(Pinus pinaster)* is used to improve inflammation and blood circulation. It helps to reduce dark spots, fine lines, and wrinkles and helps to relieve the skin and promote relaxation in nature. It used to soothe the skin texture and add a cooling effect to irritated skin.

The hibiscus *(Hibiscus sabdariffa)* is rich in antioxidants, which help to reduce the fine lines and wrinkles and cool the irritated skin. It also acts as an antiseptic for the eyes from various infections. It is the effective ingredient to use in an eye mask that improves relaxation, skin texture, and reduces stress and eye puffiness.

Jojoba oil *(Simmonds Chinese)* is rich in antioxidants and essential oils. It has a moisture content in nature that nourishes the skin. It helps to improve the skin texture, reduce eye strain, smooth the eyes, improve relaxation, and reduce stress. It has anti-microbial properties in nature to prevent the bacterial growth and provide hygiene results.

While combining these ingredients together results in various benefits, such as reducing stress, fine lines, wrinkles, microbial growth, eye puffiness, dark circles, etc., it improves blood circulation, anti-inflammatory properties, and antioxidant properties. It provides relaxation and a cooling effect to the eyes to relieve stress and result in improved sleep quality. These ingredients are not harmful to the skin; they can also be used for sensitive skin. This eye mask helps to improve the hygiene of life by providing chemical-free quality sleep.

OBJECTIVES

- To encourage a restful sleep pattern with the assistance of an herbal eye mask.
- The goal is to minimize the appearance of dark circles, fine lines, and wrinkles.
- The eye mask will be equipped with anti-microbial properties to prevent bacterial growth.
- It aims to relieve eye infections and irritation associated with chemical-based eye masks.
- The purpose is to foster a natural and sustainable lifestyle by utilizing herbal products.

SELECTION OF FIBERS - Cotton fibres

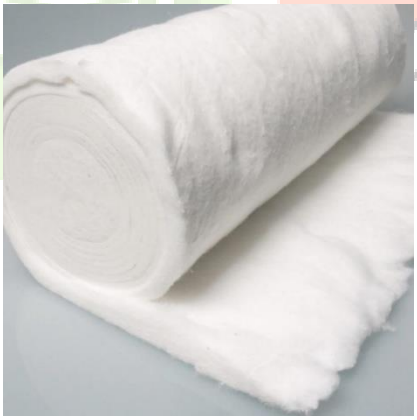


Plate.No.01 Cotton Fibres

Cotton fibres serve as an exceptional material for an herbal eye mask enriched with jojoba oil, hibiscus, pine bark, and vetiver essential oil, owing to their outstanding breathability, absorbency, and durability. The natural and hypoallergenic properties of cotton make the eye mask gentle on the skin, reducing the risk of irritation or allergic reactions. Additionally, cotton's compatibility with the herbal infusion facilitates an even distribution of jojoba oil and essential oils throughout the fabric, ensuring a consistent and effective release of the herbal benefits. The inherent softness and comfort of cotton fibres enhance the user's experience, promoting restful and rejuvenating sleep. Moreover, as a biodegradable and renewable resource, cotton aligns seamlessly with the natural and holistic principles of the herbal infusion. In conclusion, cotton fibres merge functionality, comfort, and sustainability, establishing them as the perfect choice for an herbal eye mask infused with jojoba oil, hibiscus, pine bark, and vetiver essential oil.

SELECTION OF FABRIC - Bamboo fabric

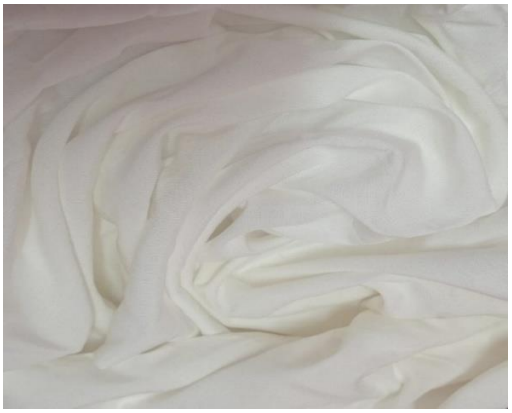


Plate.No.02 Bamboo Fabric

Bamboo fabric stands out as an excellent option for an herbal eye mask, thanks to its remarkable breathability, moisture-wicking abilities, and natural antimicrobial properties. This material facilitates the effective release of infused oils and herbs, ensuring that the eye mask remains comfortable and dry against the skin. Moreover, bamboo's natural temperature-regulating features help create a cool and soothing environment for the skin, fostering a restful and rejuvenating sleep experience. The softness and gentleness of bamboo fabric minimize the likelihood of irritation or allergic reactions, making it particularly suitable for individuals with sensitive skin. Additionally, bamboo is a highly sustainable and eco-friendly material, perfectly complementing the natural and holistic philosophy behind herbal infusions. Bamboo fabric provides unmatched comfort, functionality, and sustainability, making it the premier choice for an herbal eye mask infused with jojoba oil, hibiscus, pine bark, and vetiver essential oil.

SELECTION OF HERBS

The distinctive blend of jojoba oil, hibiscus, pine bark, and vetiver essential oil in an herbal eye mask provides remarkable advantages for relaxation, reducing inflammation, and revitalizing the delicate skin surrounding the eyes. Jojoba oil *(Simmondsia chinensis),* mimics the skin's natural oils, delivering profound hydration and nourishment, while its anti-inflammatory properties help calm the eyes. Hibiscus *(Hibiscus sabdariffa),* rich in antioxidants and alpha-hydroxy acids, gently exfoliates and brightens the skin, reducing the appearance of fine lines and wrinkles. Pine bark *(Pinus Pinaster),* celebrated for its potent antioxidant capabilities, protects the skin from environmental stressors and promotes collagen synthesis, resulting in a smoother and more radiant complexion. Vetiver essential oil *(Vetiveria zizanoides),* known for its soothing and grounding qualities, encourages relaxation and mitigates stress, allowing both the mind and body to rejuvenate. Together, these ingredients create a powerful and holistic herbal eye mask that addresses visible signs of aging and fatigue while also enhancing mental and emotional wellness, promoting overall relaxation and serenity.

Jojoba oil *(Simmondsia chinensis)*

Plate.No.03 Jojoba Oil

Jojoba oil, known scientifically as Simmondsia chinensis, is a natural oil extracted from the seeds of the jojoba plant, which is native to the southwestern United States and northern Mexico. This oil is notable for its remarkable ability to penetrate the skin easily, making it an outstanding moisturizer and emollient. For centuries, jojoba oil has been employed in various traditional medicinal applications, as well as in skincare and haircare, due to its wide array of beneficial properties. The distinctive qualities of jojoba oil render it a highly valued ingredient in skincare products. It is rich in antioxidants, including vitamin E and polyphenols, which help protect the skin from environmental stressors and potential harm.

Additionally, jojoba oil is a source of essential fatty acids, such as oleic and linoleic acids, that offer hydration and nourishment to the skin. Its anti-inflammatory properties are effective in soothing irritation, thereby reducing redness and discomfort. Moreover, jojoba oil is non-comedogenic, meaning it does not clog pores, making it suitable for all skin types, including those that are acne-prone. When incorporated into an eye mask, jojoba oil can provide significant benefits for the delicate skin around the eyes. Its hydrating properties can help minimize the appearance of fine lines and wrinkles, while its anti-inflammatory effects can alleviate irritation and redness. The antioxidant benefits of jojoba oil also play a role in safeguarding the skin from environmental damage, promoting a vibrant and youthful look. Its non-comedogenic nature ensures its compatibility with all skin types, including those prone to breakouts.

The combination of jojoba oil and pine bark in an eye mask can greatly improve the care of the delicate skin around the eyes. The antioxidant properties of jojoba oil complement those found in pine bark, providing exceptional defence against environmental aggressors and potential harm. Moreover, the anti-inflammatory benefits of jojoba oil are enhanced by the anti-inflammatory elements in pine bark, resulting in a more pronounced soothing effect. The moisturizing qualities of jojoba oil are also elevated by the hydrating benefits of pine bark, contributing to better nourishment and hydration for the skin. Overall, the synergy between jojoba oil and pine bark in an eye mask offers a powerful and effective solution for promoting healthy, youthful skin in the eye area.

Hibiscus *(Hibiscus rosa sinensis)*

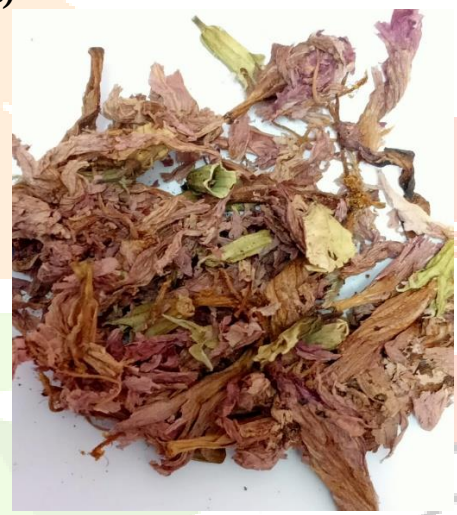


Plate.No.04 Hibiscus

Hibiscus, known scientifically as Hibiscus sabdariffa, is a plant native to tropical and subtropical regions around the world. For centuries, its flowers, leaves, and stems have been employed in various traditional practices, including medicinal uses, culinary dishes, and skincare routines. This plant is rich in vitamins, minerals, and antioxidants, making it a valuable component in skincare products.

The distinctive properties of hibiscus render it especially advantageous for skincare applications. It is abundant in antioxidants like vitamin C, vitamin E, and beta-carotene, which are essential for protecting the skin from environmental stressors. Moreover, hibiscus exhibits anti-inflammatory effects that can soothe irritation and redness, promoting a calming sensation on the skin. Its astringent properties contribute to skin tightening and firming, helping to reduce the appearance of fine lines and wrinkles. Additionally, hibiscus serves as a natural moisturizer, providing effective hydration and nourishment. When used in an eye mask, hibiscus offers numerous benefits for the delicate skin around the eyes, such as alleviating puffiness, lightening dark circles, calming irritation, and enhancing hydration, all of which support a more youthful look. The combination of hibiscus with pine bark in an eye mask can further amplify these effects, resulting in a potent formulation for skin rejuvenation.

The combination of hibiscus and pine bark in an eyemask offers significant advantages for the sensitive skin surrounding the eyes. The antioxidant capabilities of hibiscus are effectively supported by the antioxidants found in pine bark, resulting in superior protection against environmental stressors and potential damage. Additionally, the anti-inflammatory effects of hibiscus are amplified by the anti-inflammatory compounds present in pine bark, leading to enhanced soothing and calming properties. Furthermore, the moisturizing attributes of hibiscus are enriched by the hydrating compounds in pine bark, ensuring optimal hydration and nourishment for the skin.

Pine bark *(Pinus Pinaster)*

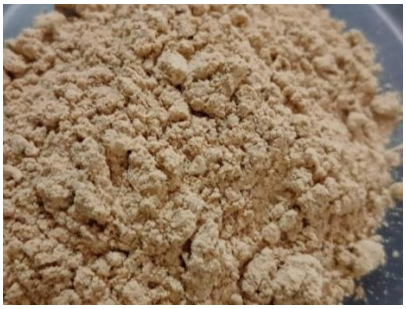


Plate.No.05 Pine Bark

Pine bark, known scientifically as Pinus bark, forms the outer layer of pine tree trunks. This natural and renewable resource has been employed for centuries in traditional medicine and skincare. Rich in a diverse array of antioxidants, including flavonoids, phenolic acids, and terpenes, pine bark plays a vital role in protecting the skin from environmental stressors and damage. Its anti-inflammatory properties are effective in soothing irritated skin, while it also contains essential vitamins A and C, along with important minerals such as potassium and magnesium. These anti-inflammatory benefits are particularly useful for reducing puffiness and inflammation around the eyes, and the antioxidants and vitamins help improve skin elasticity and firmness, thereby diminishing the visibility of fine lines and wrinkles. Additionally, the calming effects of pine bark can reduce redness and discomfort, safeguarding the sensitive skin around the eyes from harmful environmental elements like pollution and UV rays. The pleasant scent of pine bark further promotes relaxation and stress relief, making it an excellent ingredient for eye masks designed to enhance rejuvenation and tranquillity.

PREPARATION PROCESS - Preparation of oil infusion

Plate.No.06 Infused Oil

Step 1: To initiate the process, gather 50ml of jojoba oil and 25g of dried hibiscus, along with pine bark powder.

Step 2: Begin by grinding the hibiscus until it is finely powdered.

Step 3: In a suitable vessel, combine the jojoba oil with the ground hibiscus and pine bark powder.

Step 4: Heat this combination to a temperature of 80°C for two minutes to aid in the infusion of the herbs into the oil.

Step 5: Afterward, let the mixture sit for 8 to 9 hours. So, the oil will observer the properties of herbs by dissolving into the oil completely.

Step 6: Finally, strain the oil through a white cotton fabric to remove any residual sediment and impurities.

PREPARATION OF FIBRES AND FABRIC

Step 1: After strain the oil soak the fabric into the infused oil and allow the fabric to absorb the oil for 24-48 hours.

Step 2: After the fabric absorb the oil, remove the fabric from the oil extraction vessel and remove the excess oil from the fabric by drying the fabric at room temperature for 24-48 hours.

Step 3: Spray the oil solution into the cotton fibres and dry the fibres at room temperature for 24-48 hours.

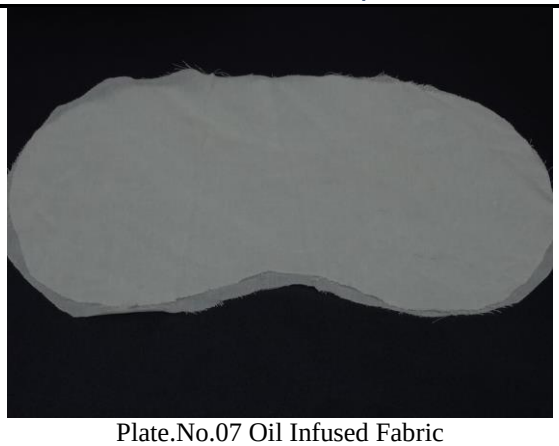


Plate.No.07 Oil Infused Fabric

MANUFACTURING PROCESS - Pattern making and cutting

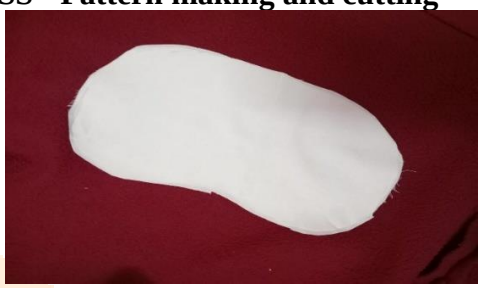


Plate.No.08 Bamboo Fabric

Step 1: To create a pattern for an eyemask, begin by deciding on the desired dimensions. A typical eyemask measures approximately 7 to 8 inches in width and 3 to 4 inches in height.

Step 2: Next, sketch a rectangle on paper or cardboard that reflects these width and height measurements, ensuring to include a 1/4-inch seam allowance around the perimeter. This piece will be designated as the "Main Body" of the eyemask.

Step 3: For the strap or elastic component, draw a long, narrow rectangle measuring 1 to 2 inches in width and 12 to 15 inches in length, again incorporating a 1/4-inch seam allowance. This piece should be labelled as the "Strap" or "Elastic."

Step 4: Additionally, mark notches on the pattern pieces to indicate where the strap or elastic will be placed, and include markings for the centre front and centre back of the eyemask.

Step 5: After finalizing the pattern pieces, carefully cut them out using scissors. Position the pattern pieces on your chosen fabric and cut the fabric accordingly, ensuring to maintain the seam allowance.

Step 6: Utilize these fabric pieces to assemble the eyemask, adhering to the pattern and markings for guidance.

SEWING THE EYEMASK

Step 1: Begin by placing the two fabric pieces together with the right sides facing inward, securing them with pins along the edges while leaving a small opening for turning the eyemask right side out. Sew along the edges using a 1/4-inch seam allowance, making sure to backstitch at both the beginning and end of your stitching.

Step 2: Once you have sewn the main body, carefully turn it right side out through the opening and press the edges with an iron for a polished look. For the strap or elastic, fold the fabric in half lengthwise with the right sides together and sew along the edge with a 1/4-inch seam allowance. After sewing, turn the strap right side out and press it flat.

Step 3: To attach the strap to the eyemask, fold the raw edges of the strap inward by about 1/4 inch, then fold it again by the same amount. Pin the strap to the eyemask, positioning it approximately 1 inch from the top edge, and secure it with either a whipstitch or a straight stitch, ensuring that you sew through both the eyemask and the strap. Finally, close the small opening with a whipstitch or a blind stitch.

TESTING AND RESULT

Skin irritation test
Ph test
Patch test
Total viable count (TVC)
Sustainability and shelf-life test

RESULT AND DISCUSSION

SKIN IRRITATION TEST

ISO 10993-10 is a global standard for evaluating medical devices' potential to cause skin irritation and sensitization. It includes in vitro tests for initial screening and in vivo tests on animals, with a recent shift towards reconstructed human epidermis methods.

RESULT: While testing the sample according to this standard procedure, there is no itching and irritation found in the sample.

PATCH TEST

The eye mask patch test, following IS 4011, evaluates skin irritation risks from eyemask materials. A small sample is applied to skin for 48-72 hours, inspected for redness or irritation, and results assessed to ensure safety and non-irritation.

RESULT: While testing the sample according to this standard procedure, there is no skin inflammation can cause by the sample.

ANTIMICROBIAL TEST

ISO 20743 standard assesses the antibacterial efficacy of treated fabrics against microbes within 18 to 24 hours. It features three methods: "Absorption Method," "Printing Method," and "Transfer Method." The "Transfer Method" involves agar inoculation, while "Printing" uses membrane-filtered bacteria for incubation.

RESULT: While testing the sample according to this standard procedure, there is no activity of microorganism found in the sample.

GSM-WEIGHT (G/SQMT) TEST

The IS 1964:2001 testing procedure for fabric grammage involves preparing a sample to extract 5 to 10 circular specimens, conditioning them at 23°C ± 2°C and 50% ± 5% humidity for 24 hours, weighing them, and calculating the average grammage in g/m².

RESULT: While testing the sample according to this standard procedure, there is 194.98 g/sqmt in the sample.

HERBAL COATED FABRIC BLEND TEST (%)

The assessment of herbal coated fabric blends for eye masks, per IS 667, involves inspecting composition, measuring weight, conducting chemical analysis, and evaluating the herbal coating's uniformity to ensure compliance with standards.

RESULT: While testing the sample according to this standard procedure, it is proved that the given test is 100% pure bamboo fabric,

SOFTNESS TEST

The In-House Method 012 for fabric softness evaluation involves conditioning a sample for 24 hours, utilizing devices like KES or ST, measuring softness in units, classifying it into categories, and reporting average softness with standard deviation.

RESULT: While testing the sample according to this standard procedure, there is Very softness feel cellulosic found in the sample.

HERBAL PRESENCE TEST

The evaluation of herbal content in eye masks follows IS 15735, involving solvent extraction from fabric, chromatographic analysis like HPTLC or GC-MS, and comparison with standards to confirm herbal constituents, ensuring claims are met.

RESULT: While testing the sample according to this standard procedure, the sample contain both herbal mixtures such as Pinus pinaster and Hibiscus sabdariffa.

ABSORBENCY TEST

The IS 2369 standard details a method for evaluating textile absorbency by measuring the time required for a fabric sample to absorb a specified volume of water under pressure. Multiple tests refine accuracy, reporting average absorbency time and providing guidelines.

RESULT: While testing the sample according to this standard procedure, there is 100% of absorbency found in the sample.

PH VALUE TEST

IS 1390:1983 details the pH evaluation procedure for textiles, especially eye masks, involving sample preparation, washing, and soaking in distilled water, with pH measurement ensuring values between 5.5 and 8.5, with minor permissible variations documented.

RESULT: While testing the sample according to this standard procedure, there is 6.9 value is found in the sample.

CHANGE IN TEMPERATURE TEST

The IS 2702/ISO 5085 standard outlines a method for assessing temperature fluctuations in textile eye masks. It involves testing fabric samples in controlled conditions and measuring temperature recovery times during heating and cooling, evaluating thermal comfort and breathability.

RESULT: While testing the sample according to this standard procedure, there is 3 different deg.cel is found from outside and inside temperature.

AIR PERMEABILITY TEST

Air permeability for eye masks is evaluated per IS 11056 by placing fabric samples in a cylindrical chamber under 100 Pa air pressure. The airflow rate is measured at controlled conditions (20°C ± 2°C, 65% ± 5% humidity) and expressed in mm/s.

RESULT: While testing the sample according to this standard procedure, there is 92 cm2 /sec air pass through the sample.

SHELF-LIFE TEST

The shelf-life of eye masks is evaluated per IS 17423 standards, involving controlled storage conditions for 90 days. Samples undergo assessments at 0, 30, 60, and 90 days, analysing physical and chemical properties to determine degradation and establish acceptable shelf-life limits.

RESULT: While testing the sample according to this standard procedure, there is 3 years of shelf-life is found for the sample.

NUMBER OF WASHING TEST

Eyemask durability is evaluated per IS 17423 by subjecting samples to washing cycles (5, 10, 20, 30) using a gentle cycle detergent. Physical and chemical properties, including tensile strength and pH, are assessed post-wash to determine degradation and resilience.

RESULT: While testing the sample according to this standard procedure, the sample will sustain the herbs for 40 washes.

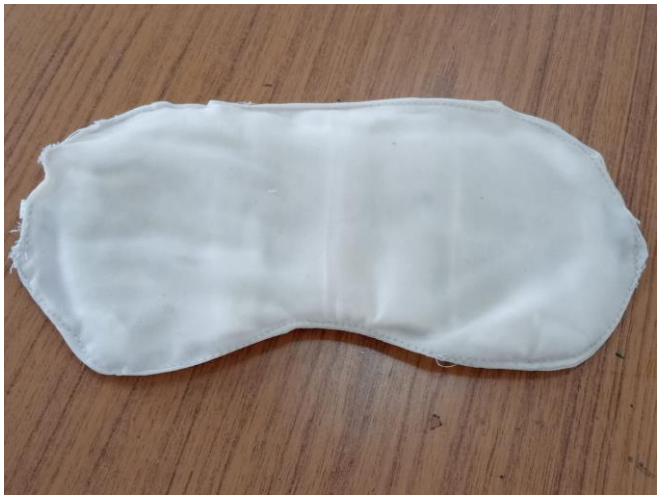
SUMMARY AND CONCLUSION

The newly developed eyemask combines jojoba oil, hibiscus, pine bark extract, and vetiver essential oil, providing an innovative alternative to conventional eyemask. Unlike typical masks focusing solely on comfort and light blocking, this eyemask offers skincare benefits and relaxation. With ingredients that hydrate, combat puffiness, and deliver antioxidant protection, it enhances the self-care experience during sleep. The cotton filling ensures breathability and comfort, making it suitable for sensitive skin. This unique formulation maximizes the therapeutic properties of the natural ingredients, promoting both restful sleep and long-term skin care benefits.

Compared to standard commercial eyemask, this advanced version stands out in both functionality and health benefits. While typical eyemask focus on light-blocking and comfort, they often lack skin nourishment and relaxation. This unique eyemask, infused with jojoba oil, hibiscus, pine bark, and vetiver essential oil, enhances hydration, combats aging, reduces inflammation, and promotes calmness. Unlike many alternatives with synthetic materials and chemicals, it offers a sustainable, eco-friendly choice that is gentle on skin and environment, merging self-care with sleep for beauty and wellness-focused consumers.

ANNEXURE

DEVELOPED EYE MASK



COST OF THE PRODUCT

Cotton fibre: Rs.7/mask
Bamboo fabric: Rs.15/mask
Elastic band: Rs.5/mask
Herbs: Rs.17/mask
Jojoba oil: Rs.40/mask
Production cost: Rs.20/mask
Profit: Rs. 36/mask
Total cost: Rs.140/mask

According to the calculated amount of raw material used for developing the eyemask, the cost per eyemask is Rs.140. when compared with market herbal eyemask, the developed eye mask is made with affordable price with reusing and washable characteristics. When this eyemask is produced in larger amount the cost of the eyemask can be cheaper.

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