

# Formulation and Evaluation of Rice Water Hair Mask

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**Abstract**—The project "Formulation and Evaluation of Rice Water Hair Mask" aims to develop an effective hair mask using natural ingredients to improve hair health and address common hair issues such as dryness, damage, and scalp problems. This study utilizes rice water, known for its high inositol content, which enhances hair elasticity and reduces friction between strands. The mask also incorporates milk protein for nourishment, vitamin E for antioxidant protection, rosemary oil for stimulating hair growth, coconut oil for deep conditioning, aloe vera gel for soothing and moisturizing, and rose water for its hydrating and aromatic properties. The formulation involves precisely blending these ingredients to achieve a consistent and effective hair mask. Evaluations include phytochemical analysis to identify the active components, organoleptic assessments for sensory attributes, physicochemical tests for stability and texture, and consumer acceptability studies. These evaluations ensure that the hair mask not only delivers the desired benefits but also meets safety and quality standards. The results indicate that the rice water hair mask is rich in essential nutrients and antioxidants, making it a potent treatment for enhancing hair vitality. The mask demonstrates excellent moisturizing, strengthening, and protective properties, making it suitable for regular use to maintain healthy, shiny, and resilient hair.

**Index Terms**—Evaluations, Formulation, Hair Mask, Rice Water

## I. INTRODUCTION

This project aims to develop a nourishing hair mask using natural ingredients to enhance hair health and vitality. The pursuit of strong, radiant hair has led to the creation of countless hair care products, but among them, hair masks stand out as deeply restorative treatments. Designed to deliver concentrated

nourishment, they address common concerns such as dryness, damage, frizz, and dullness, breathing new life into lackluster strands. [1,2]

Hair masks have been used for centuries, with cultures worldwide incorporating various ingredients and techniques to improve hair health and beauty. From ancient remedies to modern innovations, deep conditioning treatments have evolved to meet the diverse needs of consumers. At the heart of an effective hair mask is a carefully curated blend of ingredients chosen for their ability to strengthen, repair, and revitalize the hair and scalp. Advances in hair science and cosmetic chemistry have expanded the range of available ingredients, including nourishing oils, proteins, botanical extracts, and vitamins, each playing a crucial role in improving hair health. Understanding these ingredients allows consumers to make informed choices based on their unique hair needs. [1,2]

Adding a hair mask to a regular hair care routine offers numerous benefits. These treatments provide deep hydration, restoring moisture and softness to dry or damaged hair. Many also help repair split ends, strengthen brittle strands, and protect against future damage. The versatility of hair masks makes them an essential part of any routine, with formulations tailored to combat frizz, enhance shine, promote growth, and address a wide range of hair concerns.

To achieve the best results, selecting the right mask and using it correctly is key. Factors such as hair type, frequency of application, and proper technique all influence the effectiveness of a hair mask. In recent years, there has been a shift toward natural and organic hair care solutions, as more consumers seek products free from synthetic additives. As a result, many hair masks now feature plant-based extracts, essential oils,

and naturally derived ingredients for a gentler, more sustainable approach to hair care.

A well-formulated hair mask is a powerful tool for restoring and maintaining healthy, beautiful hair. With its ability to nourish, repair, and rejuvenate, it can transform dull, lifeless strands and help individuals embrace their natural beauty with confidence. As research and innovation continue to advance, the future of hair masks holds exciting possibilities, promising even more effective solutions for hair care enthusiasts worldwide.

#### A. Rice Water

Rice (*Oryza sativa*) is a staple food for nearly half of the global population, particularly in Asia, where it provides a significant portion of daily caloric intake. Rice water—the liquid left after soaking or boiling rice—is commonly consumed but often discarded during food preparation. Rice bran oil is highly valued for its antioxidant-rich compounds, including ferulic acid, gamma-oryzanol, and phytic acid, making it a popular ingredient in the cosmetic industry and skincare treatments. Both natural and nano-encapsulated forms of rice bran oil and its extracts have been explored for their potential to protect against UVB radiation, treat skin conditions, and offer anti-aging benefits. [1,2,5,6,18]

#### B. Milk Protein

Milk protein consists of phosphoproteins (containing phosphorus) and glycoproteins (containing sugar residues), with approximately 20 protein components. Caseins, which make up 80% of the total protein content in bovine milk, precipitate from raw, skimmed milk at a pH of 4.6 and a temperature of 20°C. Casein exists in four major fractions— $\alpha$ S1-,  $\alpha$ S2-,  $\beta$ -, and  $\kappa$ -casein—with about 95% forming spherical colloidal particles known as casein micelles, while 10% remains as soluble molecules. These two forms exist in equilibrium. Caseins exhibit amphiphilic properties, allowing them to engage in dual-binding interactions between their hydrophobic protein regions and calcium phosphate clusters linked to phosphoserine groups. [7,8,15]

#### C. Vitamin E

Vitamin E is one of the most well-known fat-soluble antioxidants, recognized for its ability to counteract pro-oxidant agents generated by reactive oxygen species (ROS). It neutralizes free radicals caused by factors such as ultraviolet (UV) radiation, medications,

and environmental pollutants, thereby preventing cellular damage. Its antioxidant properties primarily stem from its role in inhibiting lipid peroxidation in unsaturated fatty acids by integrating into cell membranes. Alpha-tocopherol, the most active form of vitamin E, interacts with peroxy radicals and singlet oxygen, effectively halting the lipid peroxidation process. This reaction produces a stable, low-energy radical known as tocopherol, which does not contribute to further free radical formation. Alpha-tocopherol plays a crucial role in protecting cell membranes and low-density lipoproteins (LDL) from oxidative stress. In dermatology, it is widely used—either in its pure form or as derivatives—to treat melasma, protect against UV damage, and reduce signs of aging. Its effectiveness is enhanced when combined with other antioxidants for skincare applications. [1,13]

#### D. Rosemary Oil

A study conducted by Sienkiewicz M, Łysakowska M, Pastuszka M, and colleagues examined the antimicrobial effects of basil and rosemary essential oils by exposing different strains of *Escherichia coli* to them. The researchers found that both oils demonstrated significant efficacy in eliminating all tested *E. coli* strains on Petri dishes. These results indicate that rosemary oil may have antibacterial properties that help reduce inflammation and potentially prevent hair loss. The growing interest in rosemary oil as a natural remedy for hair growth is supported by its ability to create a healthier scalp environment, which in turn promotes stronger, healthier hair. [1,9]

#### Mechanism of Action

The antimicrobial properties of essential oils are primarily linked to their chemical composition. In rosemary oil, compounds such as eucalyptol, camphor, and rosmarinic acid contribute to this effect by disrupting bacterial cell membranes, hindering cellular respiration, and preventing bacterial growth and reproduction. [1]

#### E. Coconut oil

Coconut oil is widely recognized as one of the most beneficial natural nutrients for hair, promoting healthy growth and enhancing its natural shine. It plays a vital role in reducing protein loss, which can otherwise lead to weakened or damaged hair. In the Indian subcontinent, coconut oil is a staple in daily hair care routines, often applied after bathing or showering. As

an excellent conditioner, it helps repair damaged hair while providing essential proteins that nourish and revitalize strands. Research indicates that coconut oil offers superior protection against hair damage caused by hygral fatigue. Regular scalp massages with coconut oil not only prevent dandruff but also combat chronic dryness. Additionally, it is an effective remedy for eliminating lice and their eggs. Due to its numerous benefits, coconut oil is widely used as a hair care oil and is a key ingredient in conditioners, dandruff treatments, and other hair care products. [1,9]

#### Digestive Health

**Medium-Chain Triglycerides (MCTs):** The MCTs found in coconut oil are quickly processed by the liver and transformed into energy, which may support weight management and boost energy levels.

**Antimicrobial Benefits for Gut Health:** Coconut oil's antimicrobial properties can help maintain a balanced gut microbiome by reducing harmful bacteria while promoting the growth of beneficial bacteria.

#### Gastrointestinal Health

**Digestive Support:** Aloe vera gel aids in digestive health by calming the digestive tract and alleviating inflammation. Its prebiotic properties help maintain gut microbiota balance, fostering the growth of beneficial bacteria.

**Laxative Properties:** The latex found in the inner leaf skin contains anthraquinones like aloin, which exhibit strong laxative effects. However, due to their potency, they should be used with caution.

#### F. Aloe Vera Gel

The use of the aloe vera plant dates back thousands of years, with historical records tracing it as far back as 1750 BC. With over 450 species, aloe vera is a resilient succulent that thrives in hot, arid climates across the globe. Celebrated for its healing properties, it has been widely used to treat various skin conditions, including wounds, acne, and burns. Additionally, aloe vera is incorporated into dietary supplements and beverages and is believed to aid in conditions such as inflammatory bowel disease, diabetes, and hepatitis. However, scientific research on its effects on hair remains limited. While studies on its overall benefits show mixed results, this variability may be due to the plant's complex composition and active compounds. The diverse effects of aloe vera likely arise from the interaction of its numerous chemical constituents. [1,9]

#### G. Rose Water

Rose water is well-known for its hydrating benefits, which may also be advantageous for hair care. A study by Gupta et al. (2016) explored its moisturizing effects on hair strands, revealing that rose water acts as a humectant by attracting and retaining moisture within the hair shaft. This helps improve hydration and prevent dryness. Additionally, rose water contains antioxidants like flavonoids and phenolic compounds, which may protect hair from oxidative stress-related damage. Research by Khan et al. (2018) examined its antioxidant properties on hair follicles, finding that topical application reduced oxidative stress markers, suggesting a protective role against environmental damage. Inflammatory conditions such as dandruff and scalp irritation can negatively impact hair health. Due to its rich polyphenol and essential oil content, rose water exhibits anti-inflammatory properties. A review by Patel et al. (2019) emphasized its potential in soothing scalp conditions. [1,9,16]

## II. MATERIAL AND METHODOLOGY

The hair mask will be formulated by combining rice water, milk protein, vitamin E, rosemary oil, coconut oil, aloe vera gel, rose water, and benzyl alcohol in specific proportions to achieve the desired consistency and efficacy. [1,2,11]

### A. Rice Water:

**Source:** Rice (*Oryza sativa*) belongs to the grass family (Poaceae) and is one of the world's most essential cereal crops, serving as a staple food for a large portion of the global population. Originating from Asia, it has been cultivated for thousands of years, particularly in countries such as China, India, Indonesia, Bangladesh, and Vietnam. Rice water, the starchy liquid left after soaking or cooking rice, has been used for centuries in Asia as a traditional beauty remedy for hair and skin. [1,9,14,1822]

- **History:** The use of rice water in beauty routines is thought to date back to ancient China, particularly during the Tang dynasty (618-907 AD). For centuries, it has been highly regarded for its cosmetic benefits. Even before the Qin dynasty, people used rice water, rich in starch, protein, and vitamins, to cleanse their hair and body. Beyond its cleansing properties, it was valued for softening rough skin and providing medicinal relief. It was known to help with conditions such as cold extremities, lower back

pain, frostbite, and fatigue. Essentially, this natural remedy served as a shampoo, body wash, and facial cleanser.

- During the Tang dynasty, another significant natural ingredient, the Chinese honey locust, gained recognition for its versatility. By the time of the Southern Qi Dynasty, it was praised for its skin-purifying and moisturizing effects. Additionally, it was traditionally used to treat inflammatory conditions such as swelling, pus formation, carbuncles, and various skin ailments.
- Benefits for Hair:
  - Rice water is rich in vitamins, minerals, and amino acids that nourish and strengthen hair follicles. It helps to improve hair elasticity, reduce surface friction, and enhance hair shine.
  - Rice water has been used for centuries as a natural hair treatment. It can help strengthen hair, improve elasticity, reduce split ends, and make hair shinier and more manageable.
  - Skin Care
    - Rice water contains vitamins, minerals, and amino acids that can help promote healthy skin. It may soothe and moisturize the skin, reduce inflammation, and improve overall skin tone and texture.
  - Sun Protection
    - Some studies suggest that rice water may have mild sun-protective effects when applied topically to the skin. It could help protect against UVB-induced skin damage.
  - Anti-aging
    - The antioxidants present in rice water may help protect the skin from damage caused by free radicals, which can contribute to premature aging.
  - Wound Healing
    - Rice water has been used traditionally to promote wound healing. Its soothing properties may help reduce inflammation and promote tissue repair.
  - Chemical Constituents
    1. Amino acids
    2. B vitamins
    3. Vitamin E
    4. Minerals
    5. Antioxidants
    6. Inositol
    7. Vitamin E
    8. Magnesium

9. Zinc
10. Manganese
- B. Milk Protein

Source: Milk protein, derived from cow's milk, comes in both powder and liquid forms. It consists of casein and whey protein, both known for their conditioning and reparative benefits. If your hair lacks moisture, volume, resilience, shine, length, or gloss, milk proteins could be the missing key. Casein and whey, the primary protein in milk, provide essential nutrients that support hair health. A protein-deficient diet may lead to hair thinning or slowed growth. Since healthy hair reflects overall well-being, incorporating milk proteins into your diet can help achieve thicker, shinier hair. The combination of proteins and lipids in milk strengthens hair, while calcium promotes growth and helps prevent hair loss. Additionally, milk is packed with hair-nourishing nutrients such as Vitamins A, B6, biotin, and potassium, which enhance softness and shine. Since hair is primarily made of protein, an adequate protein intake is essential for maintaining a healthy growth cycle. Another key component of hair structure is keratin, which relies on sufficient calcium intake for production. As a rich source of calcium, milk supports keratin formation, aiding in hair growth and strength.

- Benefits for Hair: Milk protein helps to fortify and strengthen hair strands, reducing breakage and split ends. It also adds volume and enhances hair texture, leaving it soft, smooth, and manageable.
- Chemical Constituents
  1. Casein
  2. Glutamine, which stimulates hair follicles and promotes hair growth
  3. Whey: Helps prevent hair loss and promote hair growth
  4. Lactoferrin: An iron-binding glycoprotein that stimulates hair growth
  5. Lactoperoxidase: The most abundant enzyme in milk, which belongs to the peroxidase family of enzymes
  6. Lysozyme: An enzyme found in whey protein that protects against bacteria, fungi, and viruses
- C. Vitamin E

Source: Vitamin E is a fat-soluble antioxidant found in various foods, including nuts, seeds, vegetable oils, and leafy greens. It is also available as a supplement and in oil form for topical use. Due to its natural antioxidant properties, vitamin E may support scalp

health and hair growth by reducing oxidative stress and free radicals that can damage hair follicle cells. While evidence is limited, some research suggests vitamin E may help prevent hair loss. A small study with 38 participants experiencing hair loss found that a component of vitamin E improved hair growth compared to a placebo. Additionally, vitamin E is believed to help restore shine lost due to damage from chemicals, heat, and styling products. Oils containing vitamin E can provide an extra protective layer for hair and skin, and many manufacturers include it in their products for this purpose. However, further research is needed to fully understand its effects on hair loss.

- **Benefits for Hair:** Vitamin E nourishes the scalp, improves blood circulation, and promotes healthy hair growth. It also protects hair follicles from oxidative stress, environmental damage, and UV radiation, preventing premature aging and hair loss
- **Chemical Constituents:**
  1. Aloins
  2. Barbaloin
  3.  $\beta$ -barbaloin
  4. Isobarbaloin
  5. Vitamins
  6. Minerals
  7. Enzymes,
  8. Amino Acids
  9. Sugars
  10. Polysaccharides

#### D. Rosemary Oil

**Source:** Rosemary oil is derived from the leaves of the rosemary plant through steam distillation. Known for its fresh, herbaceous scent, it is commonly used in aromatherapy and natural hair care products. A study by Sienkiewicz M, Łysakowska M, Pastuszka M, et al. examined the antimicrobial properties of basil and rosemary oils, specifically their effects on various strains of *Escherichia coli* bacteria. Researchers applied rosemary oil to Petri dishes containing the bacteria and found that both rosemary and basil essential oils effectively eliminated all *E. coli* strains. These findings suggest that rosemary oil possesses antibacterial properties, which may help reduce inflammation and minimize hair loss. Scientific interest in rosemary oil for hair growth continues to

grow, as it promotes a healthier scalp, ultimately supporting stronger and healthier hair.

- **Benefits for Hair:** Rosemary oil enhances hair follicle activity, encouraging growth and thickness. It regulates scalp oils, reduces inflammation, and helps prevent dandruff. Additionally, it boosts circulation, resulting in healthier and more vibrant hair.
- **Chemical Constituents**
  1. 1,8-cineol
  2. Camphor
  3.  $\alpha$ -pinene
  4.  $\alpha$ -terpineol
  5. Camphene
  6. Borneol
  7. Limonene
  8. P-cymene
  9. Rosemary oil also contains linoleic acid
  10. Oleic acid
  11. Linolenic acid
- E. Coconut Oil

**Source:** Coconut oil is extracted from the kernel or meat of mature coconuts. It is solid at room temperature but melts into a clear liquid when heated. Cold-pressed, virgin coconut oil is the most beneficial for hair and skin.

- **Benefits for Hair:** Coconut oil is packed with medium-chain fatty acids like lauric acid, which deeply penetrate the hair shaft to nourish and strengthen hair from within. It aids in repairing damage, reducing protein loss, and locking in moisture, resulting in smoother, shinier, and more manageable hair.
- **Fights Fungal Infections:** A healthy scalp is essential for strong hair growth. Research suggests that coconut oil effectively combats certain fungal infections, potentially helping with dandruff and other scalp conditions. However, further studies are needed to confirm these benefits.
- **Soothes Irritation:** As a natural saturated fat, coconut oil may alleviate scalp irritation, flaking, and itching by providing deep hydration and moisture retention.
- **Prevents Split Ends:** A 2015 review found that coconut oil penetrates hair strands more efficiently than mineral or other oils, reducing breakage and split ends. Consistent use may

minimize the need for frequent trims, creating the illusion of faster hair growth. In India, coconut oil is traditionally used as a pre-shampoo treatment and leave-in conditioner to prevent dryness and protein loss.

- Shields Against Heat Damage: Applying a small amount of coconut oil to damp hair before heat styling can offer protection against moisture-related damage and breakage. By reducing excessive swelling from water absorption, coconut oil helps maintain stronger, healthier hair
- Chemical Constituents
  1. Caprylic acid
  2. Capric acid
  3. Lauric acid
  4. Myristic acid
  5. Palmitic acid
  6. Stearic acid
  7. Oleic acid
  8. Linoleic acid

#### F. Aloe Vera Gel

Source: Aloe vera gel is derived from the leaves of the aloe vera plant by cutting them open and extracting the clear, jelly-like substance inside. The use of this plant dates back thousands of years, with records as early as 1750 BC. With more than 450 species, aloe vera thrives in hot, dry regions worldwide as a succulent. It is widely used in skincare, helping to treat wounds, acne, and burns. Beyond skincare, aloe vera is also used in food and beverages, with potential benefits for conditions such as inflammatory bowel disease, diabetes, and hepatitis. While research on its effects on hair is limited, aloe vera contains various active compounds that make studying its properties complex. Potential benefits for hair include strengthening, balancing oil production, soothing scalp irritation, and offering UV protection. Although there is no definitive scientific proof that aloe vera stimulates hair growth, some believe that compounds like aloenin may aid in this process, especially in cases of alopecia. Despite the lack of conclusive evidence, aloe vera has been traditionally used to improve hair health and minimize breakage, which may indirectly support growth. [24]

- Benefits for Hair: Aloe vera gel provides deep hydration, soothes irritation, and reduces inflammation, making it a great natural solution for a dry, itchy scalp. It helps maintain scalp pH

balance, supports hair growth, and strengthens hair strands. Additionally, it creates a protective layer on the hair, locking in moisture and shielding it from environmental damage.

- Chemical Constituents:
  1. Vitamins: A (beta-carotene), C, E, B12, folic acid, and choline
  2. Minerals: Zinc, copper, selenium, and calcium
  3. Enzymes: Amylase, catalase, and peroxidase
  4. Sugars: Mannose-6-phosphate and polysaccharides like glucomannans
  5. Anthraquinones: Aloin and emodin
  6. Fatty acids: Lupeol and campesterol
  7. Hormones: Auxins and gibberellins
  8. Salicylic acid
  9. Lignin
  10. Saponins

#### G. Rose Water

Source: Rose water is made by distilling rose petals with steam. It has a delicate floral scent and is commonly used in skincare and hair care products.

- Benefits for Hair: Rose water offers hydrating, toning, and antioxidant benefits, which contribute to scalp health and support hair growth. It also enhances hair products with a pleasant scent and helps regulate natural oils, leaving hair feeling fresh and rejuvenated. While comprehensive research on rose water's effects on hair is limited, its natural properties indicate potential advantages for both hair and scalp. As a mild astringent, it may help control excess oil and dandruff, while its anti-inflammatory qualities could assist in managing scalp conditions like psoriasis and eczema. Although its fragrance does not directly impact hair's appearance, its soothing aroma may help improve mood and alleviate headaches or irritability. Additionally, anecdotal evidence suggests that rose water can help reduce frizz and add shine, making it a popular choice for those with curly hair.

#### H. Sodium Benzoate

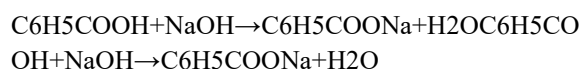
Sodium benzoate is a commonly used preservative and antimicrobial agent in food. It is the sodium salt of benzoic acid and is frequently present in a variety of food and beverage items. Below are some typical sources and methods of production:

1. Natural Sources:

- Fruits: Particularly berries, such as cranberries, blueberries, and plums, naturally contain benzoic acid, which can convert to sodium benzoate in the presence of sodium ions.
- Certain Spices: Some spices, including cinnamon and cloves, naturally contain benzoic acid.

2. Industrial Production:

- Synthesis from Benzoic Acid: Sodium benzoate is primarily manufactured by neutralizing benzoic acid with sodium hydroxide (NaOH). The reaction is as follows:



- Petrochemical Processes: Benzoic acid itself can be produced from toluene oxidation, a common petrochemical process. This benzoic acid is then converted to sodium benzoate.

Common Food Products

Sodium benzoate is often added to various food products. [1] Some examples are as follows:

1. Soft drinks, especially colas and sodas
2. Fruit juices
3. Pickles and sauces
4. Salad dressings

Preserved fish and meats Regulatory and Safety

Sodium benzoate is considered safe (GRAS) by the U.S. Food and Drug Administration (FDA) and is permitted for use in numerous countries. However, its concentration in food products is regulated to maintain both safety and effectiveness. [1]

Formulation of Rice Water Hair Mask

Table 1: Composition of Hair Mask

Ingredients	Quantity (%)		
	F1	F2	F3
Rice Water	58	65	50
Milk protein	2	2	2
Vitamin E	2	2	2
Rosemary oil	3	3	5
Coconut oil	7	10	19
Aloe vera gel	20	18	20
Rose water	6	6	6
Sodium benzoate	2	2	2

Procedure

1. Prepare the Base Mixture: In a medium-sized container, combine the fermented rice water with milk protein.
2. Stir until thoroughly mixed.
3. Blend the Oils: In a separate container, mix the coconut oil, rosemary oil, and vitamin E. Ensure the oils are well blended.
4. Create the Hydrating Solution: In another container, combine rose water with aloe vera gel. Mix until a uniform consistency is achieved.
5. Combine All Mixtures: In a large container, combine the base mixture, the blended oils, and the hydrating solution. Mix thoroughly until all components are fully integrated.

Direction of use:

- Apply the hair mask evenly to clean, damp hair or dry hair.
- Leave it on for 20-30 minutes.
- Don't leave it more than 40 minutes.
- Rinse thoroughly with cold water and proceed with your regular hair care routine.
- Let it air dry, don't use a hair dryer

Natural hair masks provide a variety of benefits for both the hair and scalp. Here are some key advantages:

1. Hydration – These masks deeply nourish and moisturize the hair, preventing dryness and breakage, making them especially useful for dry, brittle, or damaged hair.
2. Strengthening – Natural ingredients like rice water and milk protein contain essential proteins that fortify hair strands, reducing breakage and encouraging healthy growth.
3. Restoration – Hair masks can aid in repairing and revitalizing damaged hair. For instance, ingredients like rose water help mend split ends and improve overall hair health.
4. Soothing – Certain natural components, such as aloe vera gel, have calming properties that can alleviate scalp irritation and inflammation.
5. Purification – These masks help eliminate buildup and impurities from the hair and scalp, promoting a cleaner and healthier scalp environment.
6. Boosting Shine – Some natural ingredients enhance the hair's natural luster, leaving it looking radiant and full of life.

Evaluation of hair mask

1. Organoleptic Evaluation:

The prepared formulation was evaluated for its organoleptic properties, including color and odor, as well as other distinctive attributes such as appearance.

2. Physicochemical evaluation:

- pH of formulation
- Washability
- Solubility

3. Stability and Patch Test

This typically involves applying a small amount of the aqueous hair dye solution behind the ear or on the inner elbow, covering an area of about 1 square centimeter, and allowing it to dry. Any signs of irritation or discomfort are observed. A measured quantity of the prepared hair pack is then applied to the designated area for a set duration. Any signs of irritation, redness, or swelling are monitored at regular intervals for up to 24 hours. The results of these irritation tests are presented in a table. Additionally, stability testing of the formulation was conducted by storing it under various temperatures and conditions for a specific period.

III. RESULT AND DISCUSSION

All the observational data for evaluating the Hair Mask is presented in the following table:

Table 2: Phytochemical Evaluation of Ingredients

Sr. No.	Phytoconstituents	Ricewater	Milkprotein	Rosemaryoil	Aloeveragel	Rosewater
	Carbohydrates	+	+	+	+	+
	Saponins	+	+	+	+	+
	Terpenoids	+	+	+	+	+
	Alkaloids	+	+	+	+	+
	Tannins	+	+	+	+	+
	Amino acids and Proteins	+	+	+	+	+

Table 3: Organoleptic Evaluation

Sr. No	Parameters	F1	F2	F3
	Color	White	White	White

	Odor	Romance Roseise	Rejoice	Saffron
	Appearance	Creamy	Creamy	Creamy

Table 4: Physico-Chemical Evaluation

Sr. No	Parameters	F1	F2	F3
1.	pH	5.2	5.06	5.36
2.	Washability	Easily washable	Easily washable	Easily washable

Table 5: Patch Test

Sr. No	Parameters	F1	F2	F3
1.	Swelling	No Swelling	No Swelling	No Swelling
2.	Redness	No Redness	No Redness	No Redness
3.	Irritation	No Irritation	No Irritation	No Irritation

Table 6: Stability Test

Sr. No	Parameters	F1	F2	F3
1.	Change in color	No Change	No Change	No Change
2.	Change in odor	No Change	No Change	No Change
3.	Change in pH	No Change	No Change	No Change
4.	Change in texture	No Change	No Change	No Change



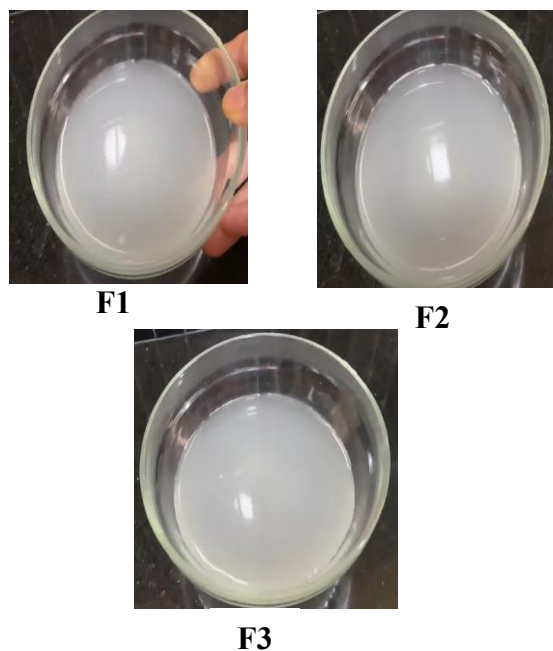


Figure 1: Rice Water Hair Mask

#### IV. CONCLUSION

The developed rice water hair mask demonstrates strong potential for enhancing hair health and addressing various concerns. The F1 formulation showed better results as compared to F1 and F2. The texture of all three formulations was found to be good but F2 and F3 show a little watery or low viscous as compared to F1. Combining rice water, milk protein, vitamin E, rosemary oil, coconut oil, aloe vera gel, and rose water creates a deeply conditioning and nourishing treatment. Phytochemical analysis confirms the presence of beneficial compounds like inositol, amino acids, and antioxidants, which contribute to hair strengthening and improved elasticity. Sensory evaluations highlight its pleasant fragrance and smooth, easy-to-apply texture, while physicochemical tests confirm its stability over time, ensuring consistent quality and safety. With a natural, chemical-free formulation, the mask aligns with the increasing demand for organic and sustainable hair care solutions. This study emphasizes the advantages of using natural ingredients in hair care, offering a safe and effective alternative to synthetic products. By harnessing the therapeutic properties of its components, the rice water hair mask promotes overall hair health. Future research could explore clinical trials to further validate its effectiveness and refine the

formula, reinforcing its potential as a top natural hair care product.

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