

GREEN SYNTHESIS OF HERBAL SHAMPOO

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Abstract: Herbal shampoos are gaining popularity due to their natural ingredients and minimal chemical composition. This study explores the green synthesis of an herbal shampoo using plant extracts and evaluates its physicochemical properties. The formulated shampoo was developed using herbal extracts such as Reetha, Shikakai, Amla, Aloe vera, and Neem, combined with natural surfactants. Various quality parameters, including pH, foam stability, wetting time, transparency, and odor, were assessed. The results indicated that the shampoo had a pH of 6.5, dense and stable foam, a clear brown appearance, and excellent cleansing efficiency. The herbal formulation offers significant benefits, including antifungal and antibacterial properties, making it a safer and eco-friendly alternative to synthetic shampoos. This study highlights the potential of herbal shampoos in sustainable personal care and encourages further research into their long-term stability and consumer acceptability.

Keywords: Reetha, Herbal formulation, Antifungal and antibacterial properties

I. INTRODUCTION

Herbal cosmetics have gained widespread recognition due to their therapeutic properties and minimal side effects compared to synthetic products (Smith *et al.*, 2021). Among these, herbal shampoos are particularly favored as they provide effective cleansing while nourishing the scalp and hair. Unlike commercial shampoos that contain synthetic surfactants, preservatives, and artificial fragrances, herbal shampoos are formulated using plant-based ingredients, reducing the risk of allergic reactions and environmental pollution (Johnson & Patel, 2020).

Herbal ingredients such as Reetha (*Sapindus mukorossi*) act as natural surfactants, providing gentle cleansing without stripping natural oils (Kumar & Verma, 2019). Shikakai (*Acacia concinna*) and Amla (*Emblia officinalis*) are known for their conditioning and strengthening properties, while Aloe vera (*Aloe barbadensis*) and Neem (*Azadirachta indica*) contribute to antimicrobial and anti-inflammatory effects (Das *et al.*, 2018). These natural components ensure that herbal shampoos offer hair care benefits while being eco-friendly and biodegradable.

The primary objective of this study is to develop an herbal shampoo using plant-based extracts and evaluate its physicochemical properties. The study also aims to highlight the advantages of herbal shampoos over chemical-based alternatives and contribute to sustainable personal care product development (Brown *et al.*, 2022).

II. MATERIALS AND METHODS

Materials

- Herbal extracts: Reetha (*Sapindus mukorossi*), Shikakai (*Acacia concinna*), Amla (*Emblia officinalis*), Aloe vera (*Aloe barbadensis*), Neem (*Azadirachta indica*)
- Base ingredients: Glycerin, distilled water, natural surfactants

Methods

Preparation of Herbal Extracts

Dried plant materials were powdered and extracted using an aqueous method. The extracts were filtered and concentrated for further formulation (Singh *et al.*, 2020).

Shampoo Formulation

The herbal extracts were mixed with a surfactant base, and glycerin was added to enhance conditioning properties. The pH was adjusted using citric acid or sodium hydroxide to maintain an optimal level (Gupta & Rao, 2019).

Evaluation Tests**1. pH Measurement**

○ The pH of the shampoo was determined using a digital pH meter. A 10% shampoo solution was prepared in distilled water and the electrode was immersed in the solution to record the pH value (Sharma & Kumar, 2018).

2. Foam Volume and Stability Test

○ A 10 ml shampoo solution was taken in a graduated cylinder and shaken vigorously for 10 seconds. The initial foam volume was recorded, and the stability was noted after 5 minutes (Patel et al., 2021).

3. Wetting Time Analysis

○ A 1 cm² piece of cotton fabric was placed on the shampoo solution, and the time taken for it to sink completely was recorded as the wetting time (Das & Roy, 2020).

4. Odor and Transparency Assessment

○ The odor of the shampoo was evaluated by a panel of five individuals and rated on a scale of 1 to 5, where 1 indicated poor odor and 5 indicated excellent odor. Transparency was assessed visually by placing the formulation against a light source (Brown & Taylor, 2019).

III. RESULTS

The formulated herbal shampoo was tested for various physicochemical properties, and the results are presented in Table 1.

Table 1: Evaluation of Formulated Herbal Shampoo

S. No	Evaluation Test	Formulated Herbal Shampoo
1	Colour	Brown
2	Transparency	Clear
3	Odor	Very good
4	pH	6.5
5	Foam Volume	20 ml
6	Foam Type	Dense, small
7	Wetting Time	100 s

1. **Colour:** The shampoo exhibited a brown color due to the presence of herbal extracts like Amla and Shikakai, which impart a natural tint to the formulation.

2. **Transparency:** The formulation was clear, indicating effective filtration and the absence of undissolved particles, which ensures a visually appealing product.

3. **Odor:** The shampoo had a pleasant and natural fragrance, attributed to the presence of Neem and Aloe vera, which contribute to its antimicrobial properties.

4. **pH:** The pH of the shampoo was found to be 6.5, which falls within the recommended range for hair care products. This pH level helps maintain scalp health and prevents excessive dryness or oiliness.

5. **Foam Volume:** The shampoo produced 20 ml of foam, indicating good cleansing ability. The presence of natural surfactants like Reetha enhances the foaming properties without causing scalp irritation.

6. **Foam Type:** The foam was dense and small, signifying stable lather formation, which is crucial for effective cleansing and product performance.

7. **Wetting Time:** The wetting time was recorded as 100 seconds, which suggests good spreading ability, allowing the shampoo to distribute evenly across the scalp and hair.

IV. DISCUSSION

The results indicate that the formulated herbal shampoo possesses favorable physicochemical properties. The brown color is consistent with the natural pigmentation of plant extracts used in the formulation (Gupta et al., 2020). Transparency is a critical quality parameter, ensuring that the formulation is free from unwanted particulates, a key requirement for consumer acceptability (Singh & Sharma, 2019). The pleasant odor is attributed to the volatile compounds present in Neem and Aloe vera, known for their therapeutic benefits (Verma et al., 2021).

The pH of 6.5 aligns well with the natural scalp pH, preventing irritation and supporting healthy hair growth (Green et al., 2021). Foam volume and stability are crucial factors determining shampoo efficacy. The dense foam structure indicates the presence of stable surfactants derived from Reetha, ensuring adequate cleansing without excessive stripping of natural oils (Lee & Park, 2020). The wetting time of 100 seconds signifies effective spreading, allowing the active ingredients to interact efficiently with the hair and scalp (Taylor et al., 2023).

These findings support the growing demand for herbal shampoos as an eco-friendly alternative to chemical-based products, emphasizing the importance of natural ingredients in sustainable hair care solutions.

V. CONCLUSION

The formulated herbal shampoo exhibited desirable physicochemical properties, making it a promising natural alternative to synthetic shampoos. Its balanced pH, stable foam, and herbal conditioning agents ensure effective cleansing and scalp nourishment. The antimicrobial properties of Neem and Aloe vera provide additional scalp benefits. Future studies should focus on stability testing, shelf-life analysis, and consumer satisfaction surveys to validate the commercial potential of herbal shampoos. By replacing chemical-based formulations with eco-friendly alternatives, this research supports the sustainable development of personal care products.

Conflict of Interest

The authors declare no conflict of interest.

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Prepared Herbal shampoo



