



## A REVIEW ON SHAMPOOS

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### ABSTRACT

Shampoo in India was derived from the Hindi word champi meaning hair massage. The introduction of shampoo in India dates back to the British reign in the country. Being a recent development the growth of shampoo or rather the penetration levels of shampoo in the India has been commendable. The shampoo market in India is estimated to be 2,500-3,000 crore. The shampoo market in India is categorized according to the benefits they provide. Mostly consisting of three kinds of shampoos cosmetic, herbal and anti dandruff, the shampoo market in India has managed to tap users of the various segments according to their requirements and preferences. Due to the continuous efforts of the top shampoo brands in India penetration of shampoos in urban areas is almost 100%. As far as penetration of shampoo in the rural areas is concerned it has risen by almost 18% in the current scenario. The market research shows upward trend in the herbal shampoo trade playing a major role in fuelling this worldwide demand for herbals. The recent interest of consumers in herbal shampoos has been stimulated by the decline of faith in modern shampoos, the belief that plant remedies were natural and thereby superior to man-made synthetic shampoos. These reasons have contributed to the increased acceptance as well as manufacture of herbal shampoos. Many herbs have been scientifically evaluated for its shampoo properties. Similarly there is a lack of scientific review on formulation and evaluation parameters for herbal shampoo preparations. This review attempts to fill up this gap and emphasizes the need for safety evaluation of herbal shampoos.

### INTRODUCTION

Shampoo is defined as a preparation of a surfactant (surface active material) in suitable form liquid solid or power which when used under the conditions specified will remove surface grease, dirt and skin debris from the hair shaft and scalp without affecting adversely the hair, scalp or health of the user. Shampoos are of various types and forms on the basis of physical appearances, constituents and properties [1].

Various forms are as under:

- Liquid clear shampoos.
- Liquid cream or cream lotion shampoos.
- Cream paste shampoos.
- Egg shampoos.
- Dry shampoos & liquid dry shampoos.
- Baby shampoos.

### Requirements of a shampoo

1. To remove sebum (the secretion of the sebaceous glands) and atmospheric pollutants from the hair and scalp.
2. To remove the residues of previously applied hair treatments, e.g. polymeric constituents from styling lotions and hair sprays.
3. To deliver an optimum level of foam to satisfy the

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expectation of the user.

4. To leave the hair in a satisfactory condition after rinsing so that it can be combed easily both in the wet and dry state.
5. To perform as a vehicle for the deposition of beneficial materials onto the hair and scalp.
6. To be non-toxic and non-irritating to the hair and the scalp.
7. To be non-damaging to the tissues of the eye if inadvertently splashed.

### FORMULATION PARAMETERS

The basic ingredients in a shampoo formulation are as follows [2].

**Active ingredient:** Suitable herbal plant materials were cleaned from unwanted foreign materials and extracted using suitable solvents. The extracts were filtered and concentrated to dryness under reduced pressure and controlled temperature (50-55°C) to obtain solvent free semisolid extracts. The solvent free semisolid extract obtained were washed, weighed and packed into plastic containers and stored at room temperature in the laboratory until its use.

**Water:** The secondary ingredient in all shampoos, it makes up about 70 to 80% of the entire formula. It helps dilute the detergents, makes the formula easier to spread and reduces irritation. It also keeps the formula inexpensive.

**Detergents:** The next most abundant ingredients in a shampoo. These surfactants are the primary cleansing ingredients and make up about 10% – 15% of the formula. They are derived from natural fatty acids or petroleum derivatives. Common primary detergents include Ammonium Lauryl Sulfate, Sodium Lauryl Sulfate and Sodium Laureth Sulfate.

**Foam Boosters:** Other types of surfactants are added to shampoos to improve the foaming characteristics of the formulation. These compounds usually betaines or alkanolamides, help increase the amount of foam and the size of the bubbles. Like primary detergents, they are also derived from fatty acids and have both water soluble and oil soluble characteristics. Typical materials include Lauramide DEA or CocamidopropylBetaine.

**Thickeners:** To some extent the secondary detergents make shampoo formulations thicker. Simply adding salt can also increase shampoo thickness. However, other materials are also used to increase the viscosity such as Methylcellulose which is a cellulosic polymer or Carbomer.

**Conditioning agents:** Some materials are added to shampoos to offset the harsh effect of surfactants. Typical conditioning agents include polymers, silicones, and

quaternary agents. These ingredients are left on the hair surface after rinsing and modify characteristics such as feel, softness, compatibility, and static charge. Shampoos that specifically feature conditioning as a benefit are called 2-in-1 shampoos because they clean and condition hair in the same step. Examples of conditioning agents include Guar Hydroxypropyltrimonium Chloride which is a polymer, Dimethicone which is a silicone, and Quaternium 80, a quaternary agent.

**Preservatives:** Any formula that contains water holds the potential to be contaminated by bacteria and other microbes. For this reason preservatives are added to prevent such growth. Two of the most common preservatives used in shampoos are DMDM Hydantoin and Methylparaben.

**Other ingredients:** A variety of other compounds are included in shampoos if desired. Dyes for changing color, fragrances for changing the odour, pH adjustment ingredients, chelating agents, opacifying ingredients, and more. Frequently, story ingredients are included so marketers will have something to talk about. This includes things like vitamins, proteins, which are not normally expected to have any impact on the final product performance. Dandruff shampoos will include a drug active ingredient like zinc pyrithione.

### EVALUATION PARAMETERS

To evaluate the prepared formulations, quality control tests including visual assessment and physicochemical controls such as pH, density and viscosity was performed [3,4]. Also, to assure the quality of products, specific tests for shampoo formulations including the determination of dry residue and moisture content, total surfactant activity, salt content, surface tension, thermal and mechanical stability and detergency tests was carried out.

#### Physical appearance/visual inspection

The formulations prepared were evaluated in terms of their clarity, foam producing ability and fluidity

#### Determination of pH

The pH of 10% shampoo solution in distilled water was determined at room temperature 25°C.

#### Determine percent of solids contents

A clean dry evaporating dish was weighed and add 4 grams of the exact weight of the shampoo was put in the evaporating dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of the shampoo only (solids) after drying was calculated.

#### Surface tension measurement

The surface tension measurement of the diluted



shampoos (% w/v in distilled water) was carried out at 20°C using du Nuoytensimeter.

### Rheological evaluations

sample container size was kept constant during the study.

### Dirt dispersion

Two drops of shampoo were added in a large test tube contain 10 ml of distilled water. 1 drop of India ink was added; the test tube was stoppered and shakes it ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy.

### Cleaning action

5 grams of wool yarn were placed in grease, after that it was placed in 200 ml of water containing 1 gram of shampoo in a flask. Temperature of water was maintained at 35°C. The flask was shaken for 4 minutes at the rate of 50 times a minute. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated by using the following equation:

$$DP = 100(1 - T/C)$$

In which, DP is the percentage of detergency power, C is the weight of sebum in the control sample and T is the weight of sebum in the test sample.

### Surface tension measurement

Measurements were carried out with a 10% shampoo dilution in distilled water at room temperature. Thoroughly clean the stalagmometer using chronic acid and purified water. Because surface tension is highly affected with grease or other lubricants.

The data calculated by following equation given bellow:

$$R3 = \frac{(W3 - W1) N1 \times R1}{(W2 - W1) N}$$

Where W1 is weight of empty beaker, W2 is weight of beaker with distilled water, W3 is Weight of beaker with shampoo solution, N1 is no. of drops of distilled water, N2 is no. of drops of shampoo solution, R1 is surface tension of distilled water at room temperature.

### Detergency ability<sup>5,6</sup>

The Thompson method was used to evaluate the detergency ability of the samples. Briefly, a crumple of hair were washed with a 5% sodium lauryl sulfate (SLS) solution, then dried and divided into 3g weight groups. The samples were suspended in a n-hexane solution containing 10% artificial sebum and the mixture was shaken for 15 minutes at room temperature. Then samples were removed, the solvent was evaporated at room temperature and their sebum content determined. In the next step, each sample was divided into two equal parts, one washed with 0.1 ml of the 10% test shampoo and the other considered as the negative control. After drying, the

The viscosity of the shampoos was determined by using Brookfield Viscometer set at different spindle speeds from 0.3 to 10 rpm. The viscosity of the shampoos was measured by using spindle T95. The temperature and residue on samples was extracted with 20 ml n-hexane and re-weighed. Finally, the percentage of detergency power was calculated using the following equation:

$$DP = 100(1 - T/C)$$

In which, DP is the percentage of detergency power, C is the weight of sebum in the control sample and T is the weight of sebum in the test sample.

### Skin sensitization test [7]

Shampoos were applied onto nude skin of guinea pigs. A 0.8% v/v aqueous solution of formalin was applied as a standard irritant on animal. The animals were applied with new patch/formalin solution up to 72 hours and finally the application sites were graded according to a visual scoring scale, always by the same investigator. The erythematic scale was as follows: 0, none; 1, slight; 2, well defined; 3, moderate; and 4, scar formation (severe).

### Eye irritation test [8]

About 1% shampoo solutions was dripped into the eyes of albino rabbits with their eyes held open with clips at the lid. The progressive damage to the rabbit's eyes was recorded at specific intervals over an average period of 4 seconds. Reactions to the irritants can include swelling of the eyelid, inflammation of the iris, ulceration, hemorrhaging (bleeding) and blindness.

### Stability studies

The thermal stability of shampoo was studied by placing in glass tubes and they were placed in a humidity chamber at 45°C and 75% relative humidity. Their appearance and physical stability were inspected for a period of 3 months at an interval of one month.

### CONCLUSION

Natural products are becoming increasingly popular amongst the health and environmentally conscious shoppers of today. This new age craze also extends itself to hair care, the never-ending struggle of maintaining healthy hair has posed to be a problem and constant battle among many people today. They are starting to realize that this is potentially the result of continuous exposure of harmful chemicals to the hair. With people becoming more aware of how natural products can positively affect our lives they are making the switch and opting for safer and healthier options. Thus quality control for efficacy and safety of herbal shampoo is of paramount importance. So quality control test must be carried out for herbal cosmetics. It is assumed to be safe for longer periods of time.



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