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Comparative Study of Marketed Shampoo Preparations

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ABSTRACT

The conduct of this study is to perform evaluation test on marketed synthetic shampoos. Shampoos are the commonly used hair care products. It is often used to remove the dirt and debris from hair and hair scalp without stripping out so much sebum thus prevents hair damage. To evaluate the synthetic shampoo samples, the following evaluation test like physical appearance, determination of pH, dirt dispersion test, determination of solid content, surface tension measurement, viscosity, cleaning action and foaming ability test are performed. The following parameters are evaluated to ensure the safety and effectiveness of the marketed products. On evaluating the shampoo preparations for the above parameters, we could conclude all the necessary considerations of a safe and efficacious shampoo.

Keywords: Synthetic Shampoo, Comparative evaluation, Safe and effective used

INTRODUCTION

A Cosmetic product is a substance or preparation intended to be placed in contact with various external parts of human body, epidermis, hair, nails, lips, teeth and mucous membranes of oral cavity with a view exclusively or mainly to clean, perfuming or to change their appearance or protecting them.

The word Cosmetics arises from a Greek word “KOSMETICOS” – meaning “to adorn”. Cosmetics are formulated as solids, liquids or semisolids. It helps us to improve the appearance of skin due to its pigmentation appearance, texture, and elasticity.

Shampoo is a preparation of surfactant (surface active material) in a suitable form- liquid, solid, powder, which when used under the specified conditions will remove surface grease, dirt and skin debris from the hair shaft and scalp without adversely affecting the user.

Ideal Properties of Shampoo

• It can be easily removed by rinsing with water.

• It should have pleasant Odor.

• It should be non-toxic and non-irritant to the eye.

• It should have good foaming properties.

• It should provide good finishing after washing the hair.

Excipients used in shampoo

1.Surfactants:

Surfactants are the agents which are used to reduce the surface tension / interfacial tension. These agents are used to produce cleansing as well as foaming action.

a. Anionic surfactant

b. Cationic surfactant

c. Non-ionic surfactant

d. Amphoteric surfactant

a) Anionic Surfactants:

Anionic surfactants are also known as principal surfactants. These molecules carry negative charge which provide cleaning and foaming action.

E. g: Alkyl Sulphates - Sodium Lauryl Sulphate, Ammonium Lauryl Sulphates, Alkyl benzene Sulphonates – α -Olefin Sulphonate.

b) Cationic Surfactants:

These molecules are positively charged and bind to the negatively charged hair and there by reduces the static charge. It is also known as secondary surfactants and are used in low concentration due to its toxicity. It produces conditioning effect rather than the foaming action. Eg: Quaternary Ammonium Compounds - Cetrimonium Bromide, Cetrimonium Chloride.

c) Non-ionic Surfactants:

Non -ionic surfactants does not produce foam but are largely used as foam boosters, viscosity inducers, emulsion stabilizers and opacifiers. These surfactants are those which do not have any ions. Thus, it does not undergo ionization upon dissolution with water.

Ex: Poly alkanol amide, Amine oxide, Poly sorbate.

d) Amphoteric Surfactants:

These surfactants form zwitter ions in neutral PH. They are either positively or negatively charged depending upon the acidic and basic medium.

Ex: Coca Betaine, Cocamide propyl Betaine.

2.Solubilizing agent

These agents enhance the solubilizing property of poorly soluble substances.

E. g: Ethyl alcohol, Diethylene glycol, Mono ethyl ether.

3.Foam builders

Foam builders lead to formation of gas bubbles which provides detergency property to hair and scalp.

Ex: Carbopol 934.

4.Sequestering agent

These are the agents which are used to prevent the formation of insoluble metal ions (magnesium & calcium) which are formed, when it comes in contact with the hard water.

Ex: EDTA Salt, Citric acid.

5.Viscosity modifier

These are the agents used to impart the viscous behaviour in shampoo. Hence it can maintain its own consistency.

Ex: Gum tragacanth, alginate, ammonium chloride, hydroxyl ethyl cellulose.

6.Opacifiers

These are the agents used to obtain pearlescent effect.

Ex: Ethylene glycol stearate, Cetyl alcohol, Stearyl alcohol.

7.Conditioning agent

Humectants are commonly used as conditioners. These agents are used to improve feel and lustre of hair.

E. g: Lanolin, mineral oil, egg derivatives.

8.Fragrance

These are the agents used to impart the pleasant odor to the preparation.

E. g: Benzyl salicylate, citronellol, hexyl cinnamoyl.

9.Preservatives

Preservatives are the agents used to prevent the microbial growth and protect the shampoo without any deterioration until its shelf life.

Ex: Formaldehyde, Methyl paraben, Propyl paraben.

Materials And Methods

The samples of shampoo are selected randomly to perform evaluation test.

1. Physical Evaluation

2. pH Determination

3. Dirt Dispersion Test

4. Solid content determination

5. Surface tension determination

6. Cleaning Action

7. Foaming ability Test

8. Viscosity determination

1.Physical appearance:

The shampoo formulation generally should have a uniform, smooth, transparent texture. The

shampoo samples A, B and C were evaluated for its colour.

2. Determination of pH:

• Initially the pH meter is calibrated by maintaining in a neutral PH range.

• The Electrodes used is cleansed and well dried.

• Later 10% shampoo solution is prepared by dissolving in water at room temperature.

• The electrode is immersed into the prepared shampoo samples A, B and C.

• The pH of the samples is then recorded.

Generally, pH ranges from (4-9) in shampoo formulations. Most shampoos are neutral or slightly acidic in nature. Acidic solutions cause the cuticle to swell and open up which makes the hair seem smoother. Basic solution makes hair frizzier.

3.Dirt dispersion Test:

• For the test to be performed, clean and dried test tubes containing 10 ml water is taken.

• Add 2 drops of shampoo into each test tube.

• Add one drop of Indian ink to each of the test tubes containing shampoo samples A, B and C.

• Shake the test tubes for 10 times.

• Observe the amount of ink concentrated in the foam and record it.

The used Indian ink represents dirt particle that may be deposited on the hair surface. The amount of Indian Ink in the foam was estimated as none, light, moderate or heavy.

4. Determination of Solid content:

• Initially a clean and dry China dish was weighed

• Add 4 g of shampoo to the China dish and weigh it.

• The dish containing shampoo samples was placed on hot plate and heated until the liquid portion of the sample is evaporated.

• Later the evaporated shampoo samples are weighed after cooling.

Solid content (%) = Initial weight – Final weight

5. Determination of Surface tension:

• In this method, flattened end of clean dry stalagmometer is dipped into the liquid samples A, B and C whose surface tension is to be determined.

• The liquid is sucked up to mark A and then it allowed to drop slowly from the tip of the stalagmometer.

• A total of 20- 30 drops into a previously weighed clean specific gravity bottle and weight of one drop of the sample is determined.

• After this the stalagmometer was again cleaned with acetone and dried.

• The liquid with known surface tension (water) is taken up in the stalagmometer and

weight of one drop of water is obtained.

• The surface tension is then calculated by the following equation:

Surface tension of shampoo = (W3 –W1) n1 ÷ (W2-W1) n2 × R1.

W1 = Weight of Empty Beaker

W2 = Weight of Beaker with Distilled water

W3 = Weight of beaker with shampoo solution

n1 = No. of drops of distilled water

n2 = No. of Shampoo solution

R1 = Surface tension of distilled water

6. Cleaning Action:

5 Grams of wool yarn were placed in grease; after that it was placed in 200 ml of water containing 1g of shampoo in flask. Temperature of water was maintained at 350c. The flask was shaken for 4mins 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 using the following equation.

DP = 100 (1-T/C)

DP – The percentage of detergency power

C - The weight of sebum in the control sample

T – Weight of sebum in the test sample

7. Foaming ability:

• To 100 ml measuring cylinder, 1% shampoo solution of different samples A, B and C was added and dissolved in water.

• The measuring cylinder containing samples were shaken for 10 times.

• Record the Foam produced in the measuring cylinder at 1mins, 2mins, 3mins, 4mins and 5mins.

• Compare the foam height of all three samples and is tabulated.

8.Viscosity Determination:

• The viscosity of shampoo samples of A, B and C was determined by using Brookfield

viscometer.

• In this a suitable spindle of used after thorough cleaning.

• The spindle was immersed into the shampoo samples in such a way that it has no contact with the base part of the beaker with samples.

• The spindle is then rotated at 10 Rpm for 5 min.

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• The readings are then recorded.

Result And Discussion

Evaluation of Physical appearance

Table 1: Evaluation of Physical Appearance

Sl. no	Formulation	Physical Appearance
1.	Sample A	Creamy White
2.	Sample B	White
3.	Sample C	Creamy White

Table 2: Evaluation of pH.

Sl no	Formulation	P^H
1.	Sample A	5.78
2.	Sample B	5.92
3.	Sample C	6.23

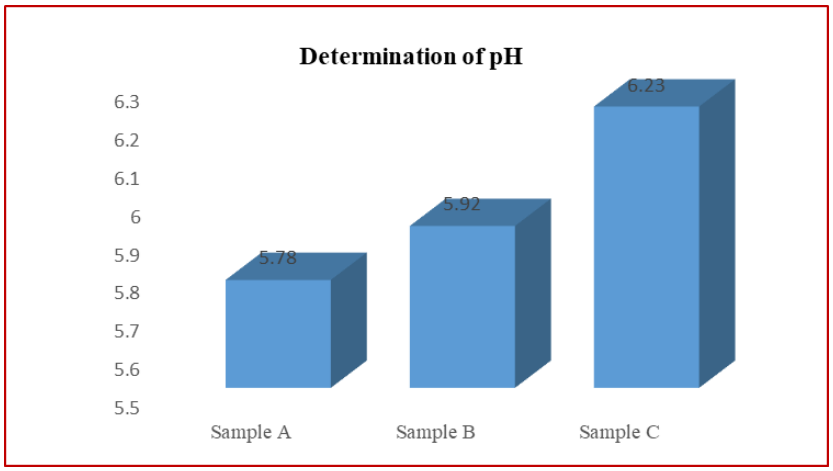

Fig 1: Determination of pH.

If the sample is in acidic PH, it helps to improve shining characteristic of hair as mild acidity prevents swelling and promotes tightening of hair scales and thus enhance the properties of hair scalp and prevents skin irritation. If the sample is in basic PH, it promotes fizziness in hair. On Determining the PH of the samples, it indicates that the sample A, B, C lies in an acidic PH Range. The acidic solutions cause the cuticle of the hair to shrink and lay flatter on the shaft of the hair thus promotes smoothness of hair. The Normal PH Range of the shampoo is said to be 3.5 – 9.

Evaluation for Dirt Dispersion Test

Table 3: Evaluation of dirt dispersion.

Sl no	Formulation	Dirt Dispersion
1.	Sample A	Moderate
2.	Sample B	Light
3.	Sample C	Light

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Fig 2: Evaluation for dirt dispersion test.

An important evaluation test performed in order to test the cleaning action of shampoo. The Shampoo that has the ability to concentrate the used Indian ink in foam is considered as poor quality because the ink or the dirt that cannot be rinsed is similar to that of the dirt that deposits on the hair. Ideal shampoo always has the ability to retain in the water portion to ensure better cleaning action.
From the above test, it is concluded that sample B & C has better cleaning action as the samples have less tendency to concentrate in the foam. Sample A has moderate dirt dispersion in foam and is said to have poor cleaning action as the dirt is easily removed from water rather than foam.

Evaluation of percentage Solid content

Table 4: Evaluation of percentage solid content.

Sl no	Formulation	% Solid Content
1.	Sample A	15%
2.	Sample B	22.5%
3.	Sample C	17.5%

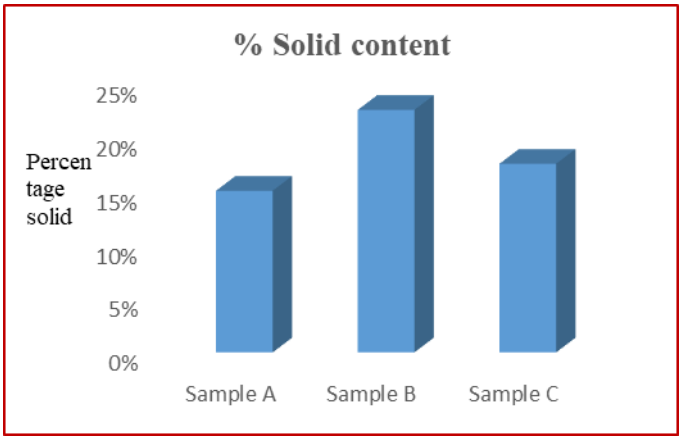


Fig 3: Evaluation of percentage solid content.

The presence of solid contents in the shampoo preparations is considered to be important to develop an ideal shampoo with its unique properties and stability. In general, an ideal shampoo must have 20-30% of solid content in order to maintain its stability. If the formulation has less than the normal range, it will be too watery or the preparation may wash away quickly on application and produces less effectiveness.

On evaluating the solid content in the samples, it was found that only sample B has normal range of solid content in the formulation and thus it exhibits the ideal property of shampoo.

Fig 4: Evaluation of percentage solid content.

Evaluation of formulation for Surface tension

Table 5: Evaluation of surface tension.

Sl no	Formulation	Surface Tension
1.	Sample A	25.10 dynes/cm
2.	Sample B	32.36 dynes/cm
3.	Sample C	28.23 dynes/cm

Fig 5: Evaluation of surface tension.

Determination of surface tension is an important property to evaluate the spread ability and penetrating capacity of a shampoo into dirt. This property is directly related to shampoos ability to remove dirt. Greater the surface tension, lesser the cleansing action of the shampoo.

From the above test, it is found that sample A has lower surface tension which indicates that the shampoo sample has higher cleaning action.

Evaluation of percentage Cleaning Action

Table 6: Evaluation of cleansing action.

Sl no	Formulation	% Cleaning action
1.	Sample A	32.14%
2.	Sample B	24.31%
3.	Sample C	30.16%

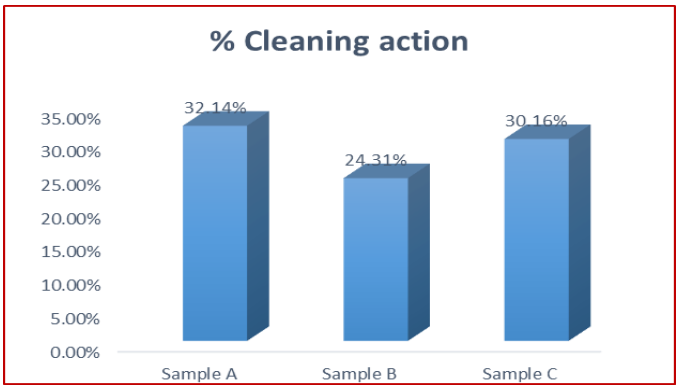


Fig 6: Evaluation of percentage cleansing action.

Cleaning action is the primary function of shampoo and other hair care products. The sebum removal from hair is essential in order to maintain the health of hair and hair scalp.

In determination of cleaning action, it is observed that sample A has higher cleaning action than other samples B and C. The sample A with lower surface tension has better cleaning efficiency.

Fig 7: Evaluation of percentage cleansing action.

Evaluation of Foaming action

Table 7: Evaluation of forming action.

FORMULATION	1 Time (min)	2 Time (min)	3 Time (min)	4 Time (min)	5 Time (min)
Sample A	53	50	48	44	43
Sample B	70	67	65	63	62
Sample C	65	63	63	62	60

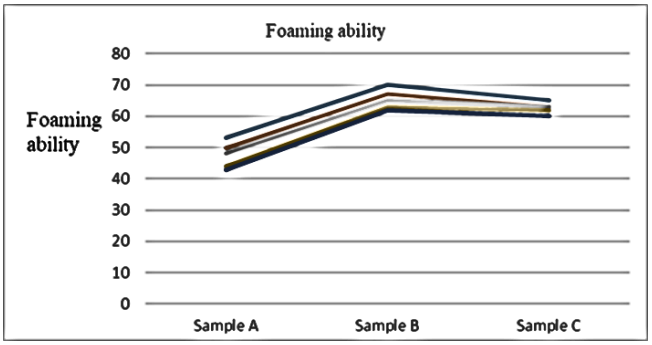
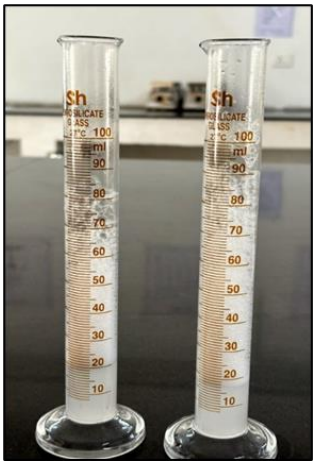


Fig 8: Evaluation of forming ability.

The foaming ability of shampoos has no larger influence on the cleansing action of the shampoo preparation, but is also a major concern to be considered as the consumers believe higher the foam, greater is the quality of the product.

The sample B has greater foaming ability in water than the other two samples B and C.



Sample A& B

Sample C

Fig 9: Evaluation of forming ability.

Determination of viscosity

Table 8: Evaluation of viscosity.

Sl. No.	Formulation	Viscosity
1	Sample A	8700CP
2	Sample B	4080 CP
3	Sample C	11160 CP

The normal viscosity range for shampoo is 5000- 20,000Cp. Viscosity can be related to the number of solids present in the preparation. It is simply defined as the thickness of the liquid preparation. The viscosity of the shampoo can be correlated to its flow property, Stability and Shelf life.

Here the sample A and C lies in the normal range of shampoo standards. Thus, the sample A and C has good consistency that helps easier application of shampoo to the hair.

Fig 10: Evaluation of viscosity.

CONCLUSION

Shampoo being the most widely marketed and used product in the hair care cosmetics, make it essential to evaluate the safety, efficacy and quality of the product. It is commonly used formulation for treatment of Dandruff, Hair fall and other hair damages. In this work, different brands of synthetic marketed shampoo samples are being evaluated to test its effectiveness.

The aim of this work is to evaluate the effectiveness and compare the potential of different marketed shampoo formulation. The marketed shampoos of three different brands are randomly chosen for evaluation of various parameters to test and prove its quality. From the various test procedures, it is proved that the given samples are effective and meets standard requirements of the shampoo formulation.

From the above work performed, it can be concluded that the all three samples A, B and C shows acidic pH range. On evaluation, the determination of Surface tension, cleaning action the sample A is efficient than the other two samples B and C. In viscosity determination, the sample A and C is observed to lie in the normal range of shampoos.

On determining the foaming ability and % solid content, it can be concluded that the sample B is efficient than other two samples A and C. By evaluating the dirt dispersion parameter in the shampoo samples, it is concluded that both the samples B and C shows better cleaning action.

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