

Formulation and Evaluation of Hair Conditioners A Research Article

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ABSTRACT: Hair is an imperative part of the human body which protects the scalp. Hair Conditioner is a hair care product, which is applied to the hair and hair tips after shampoo in order to condition the hair and then it is rinsed out. Hair Conditioner is used to improve the manageability and to enhance lustrous look of hair. Its main purpose is to reduce friction between the hair strands to allow easier brushing and combing. The main objective is to develop the most effective hair care product to meet people's compliance, and to evaluate the prepared hair care product to establish desired effect on the user.

Three types of hair conditioners were formulated, they are Herbal Hair Conditioner, Synthetic Hair Conditioner and Ayurvedic Hair Conditioner. In Herbal Hair Conditioner, Fenugreek and mint were used as main ingredients. In Synthetic Hair Conditioner main ingredient is Sodium Lauryl Sulphate, PABA and Benzophenone were also used. In Ayurvedic Hair Conditioner powered Henna, Amla, Shikakai and Reetha were used as main ingredients. All the formulations of Hair Conditioners were then evaluated and analyzed on the basis of various organoleptic properties and physicochemical parameters such as pH, Dirt Dispersion Test, Moisturising Time, Cleaning Action and Stability Testing.

Keywords: Herbal Hair Conditioner, Synthetic Hair Conditioner, Ayurvedic Hair Conditioner, Organoleptic properties, Physicochemical Parameters, Stability testing.

I. INTRODUCTION:

Hair conditioner is a hair care product that is applied after shampooing in order to condition the hair. Conditioning helps protect your hair and restore it.

Conditioner means a preparation used to improve the condition of hair. The product is beneficial to all types of hair. It works by restoring moisture, and smoothing the cuticles of the hair follicles. Hair conditioner comprising of powerful antioxidants can reduce UV damage to the hair including hair colour changes and protein damage.

Three types of Hair Conditioners were made and then evaluated for their properties.

HERBAL HAIR CONDITIONER : Herbal Conditioners are meant to stop most of the hair issues. Since natural conditioners are free from chemicals. The main ingredients used are **Fenugreek seeds** which are rich source of iron and protein – two essential nutrients for hair growth, They also contain unique composition of plant compounds, including flavonoids and saponins. These compounds are presumed to induce hair growth due to their anti-inflammatory and antifungal effects. **Mint leaves** which have one of the highest sources of carotene and antioxidants, they offer natural antimicrobial and antifungal properties, that helps quash dandruff and other scalp issues.

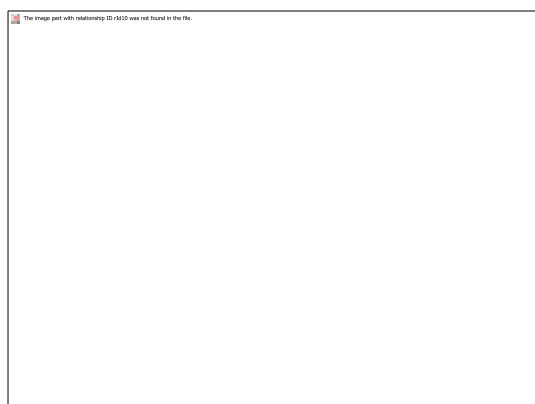


Fig 1: Mint leaves



Fig 2: Fenugreek Seeds

Procedure:

- ❖ We take 4.2gm of fenugreek seeds and 4.2gm of mint leaves in a china dish and add 100ml of water to it.
- ❖ Boil it until 1/4th of the liquid remains in it.
- ❖ This process is fully from plant extract.
- ❖ In the next step, aloe vera gel (3gm), citric acid (3gm) & glycerin (6ml) taken in another beaker and stir continuously to required solution get dissolved.
- ❖ This process is called aqueous phase.
- ❖ In another beaker almond oil (3ml) & coconut oil (3ml) mixed and stirred.
- ❖ Aqueous phase will be added drop by drop to plant extract and stirred continuously and to this solution oil phase will be added drop by drop and continuously stirred.
- ❖ In this preparation, pinch of the methyl paraben is added as a preservative to the above solution.
- ❖ The final solution will be measured in a measuring cylinder which results 40ml.
- ❖ To this solution 10ml rose water added to make up for 50ml.
- ❖ To increase the viscosity of the solution, this solution kept under mechanical stirrer for about 20 minutes.

The below table illustrates the quantity of ingredients used in 8 formulations

Ingredients	1	2	3	4	5	6	7	8
Fenugreek extract (ml)	4.5	4.2	5	5.5	6	6.5	7	7.5
Mint extract (ml)	4.5	4.2	5	5.56	6	6.5	7	7.5
Aloevera gel (ml)	3.5	5	3	4	4.5	5.5	6	6.5
Glycerine (ml)	10	12	14	16	18	20	22	8
Methyl Paraben(gm)	2	2.5	3	3.5	4	4.5	5	5.5
Rose Water (ml)	5	5	5	5	5	5	5	5
Coconut Oil (ml)	3	3.5	4	4.5	5	5.5	6	7

Almond Oil (ml)	3	3.5	4	4.5	5	5.5	6	7
Water	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s



Fig 3: 8 FORMULATIONS OF HERBAL HAIR CONDITIONER

SYNTHETIC HAIR CONDITIONER: Synthetic Hair Conditioners are basically compositions containing cationic surfactants in combination with long chain fatty alcohol and other lipid components. The main ingredients used are **PABA** and **Benzophenone** which protects the hair from UV damage, **Sodium Lauryl Sulphate** that is a cationic surfactant which provides cleansing action.

Procedure:

- Take 0.5 gm of benzophenone in 10 ml of propylene glycol in a beaker and heat in a water bath till benzophenone gets dissolved completely.
- Weigh 1.64 gm of Albumin and 0.65 gm of PABA in another beaker, add water to it and mix them well.

- In a beaker take 1.6 gm of Sodium lauryl sulphate, 0.5 gm of Silicone dioxide, 0.5 gm of methyl paraben and 15ml of glycerin, stir thoroughly with the help of glass rod.
- Add the mixtures of benzophenone and propylene glycol, Albumin and PABA to the beaker containing Sodium lauryl sulphate.
- To the final mixture add 2 ml of lavender oil and 2 ml of rose oil.
- Mix them well and add 3.5gm of citric acid to adjust the pH.
- To increase the viscosity of the solution, this solution kept under mechanical stirrer for about 20 minutes.



Fig 4: MECHANICAL STIRRER

The below table illustrates the quantity of ingredients used in 8 formulations

Ingredients	1	2	3	4	5	6	7	8
Benzophenone (gm)	0.5	1	0.8	1.5	0.65	1.3	2	1.6
Propylene glycol (ml)	10	20	15	11.5	13	18	16	12
Albumin (gm)	1.6	3.2	2.5	2	3	2.36	2.65	1.7
PABA (gm)	0.65	1.3	1	1.5	0.8	1.6	1.5	0.9
Sodium Lauryl Sulphate (gm)	1.6	3.2	2.5	2	3	2.36	1.55	3.35
Silicone dioxide (gm)	0.5	1	0.8	0.65	0.9	0.7	1.2	1.35
Methyl Paraben (gm)	0.5	1	0.8	0.65	1.2	1.5	0.9	0.6
Glycerin (ml)	15	30	22	20	25	16	18	28
Citric Acid (gm)	3.5	6.0	5.5	5	4.5	5.2	6.9	4.9
Rose oil (ml)	1	2	1.5	0.8	1.2	1.8	2.5	2.8

Lavender oil (ml)	1	2	1.5	0.8	1.2	1.8	2.5	2.8
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Fig 5:8 FORMULATIONS OF SYNTHETIC HAIR CONDITIONERS

AYURVEDIC HAIR CONDITIONER

Ayurvedic hair conditioners are various Ayurvedic herbs and oils used for strengthening, nourishing, and conditioning the hair. The Ayurvedic system of medicine mentions many herbs and oils which are considered good for hair conditioning. The main ingredients used are **Henna** which covers each hair

shaft and builds a protective layer that safeguards the strands from damage. **Amla** strengthens hair follicles and reduces hair thinning. **Shikakai** strengthens the hair from roots, prevents split ends, breakage and hair fall. **Reetha** helps to control dandruff and promotes hair growth due to its Tridosha balancing property.



Fig 6: SHIKAKAI AND REETHA



Fig 7: HENNA



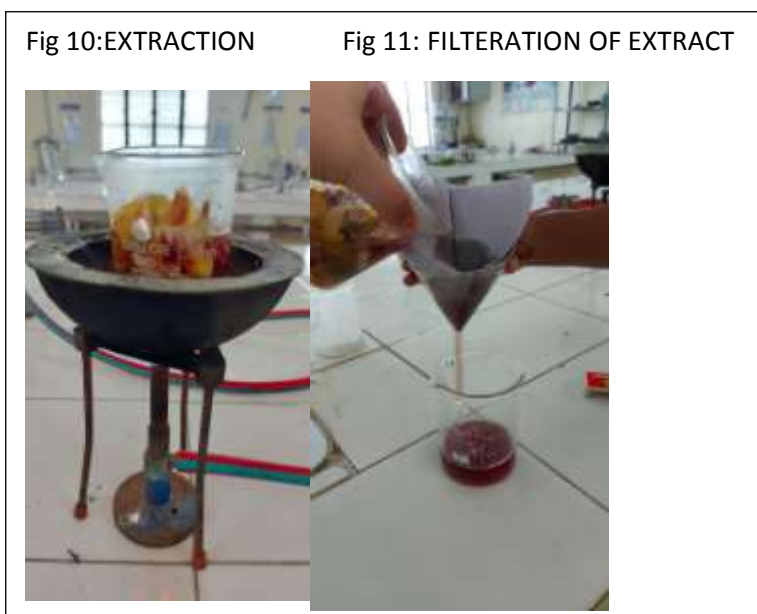
Fig 8: AMLA



Fig 9: HIBISCUS

Procedure:

- Weigh accurate amount of henna powder and dissolve it in sufficient amount of water to make a paste.
- Weigh Reetha powder, Shikakai powder and Amla powder separately and dissolve them in water to make paste in different beakers.
- Now mix all the pastes together in a beaker and add hibiscus extract (Boil Hibiscus flowers in a beaker on water bath for 30 minutes and then filter the extract).
- Add measured amounts of Glycerin to it, to make it in the form of slurry.
- Olive Oil is added in the mixture with the help of dropper.



The below table illustrates the quantity of ingredients used in 8 formulations

Ingredients	1	2	3	4	5	6	7	8
Reetha (gm)	1	1.5	1.8	2	2.5	3	3.5	4
Amla (gm)	1	1.5	1.8	2	2.5	3	3.5	4
Shikakai (gm)	1	1.5	1.8	2	2.5	3	3.5	4
Henna (gm)	1	1.5	1.8	2	2.5	3	3.5	4
Hibiscus juice (ml)	3	4.5	5	6.5	6	5.5	4	3.5
Glycerin (ml)	15	12	20	18	24	22	20	14
Olive oil (ml)	5	5.5	5	5.5	5	5.5	5	5.5
Water (ml)	q.s	q.s	q.s	q.s	q.s	q.s	q.s	q.s



Fig 12: 8 FORMULATIONS OF AYURVEDIC HAIR CONDITIONERS

EVALUATION TESTS: 8 Formulations each of Herbal Hair conditioner, Synthetic Hair Conditioner and Ayurvedic Hair Conditioner were made and evaluated by the following evaluation tests.

pH TEST: The pH meter was calibrated and then the electrode was dipped in Hair Conditioner.

DIRT DISPERSION TEST: 2 drops of conditioner were added in large test tube contain 10ml of distilled water, 1 drop of India ink was added, the test tube was stoppered and shakes it 10 times. The amount of ink present in the foam was estimated as none, light, moderate (or) heavy.



Fig 13 : Before dispersion test



Fig 14: Formation of foam

MOISTURISING TIME DETERMINATION: 1gm of hair ball with approximate of 20cm³ size

was placed on the surface of foam of different dilution of conditioner and the complete sinking

time of the hair ball in the conditioner was measured 5-15min were required to sink for silky

smooth hairs.



CLEANING ACTION:5gm of wool yarn were placed in Grease after that it was placed in 200ml of water containing 1gm of conditioner in a flask. Temperature of water was maintained at 350⁰c. The flask was shaken for 4min at the rate of 50times in

a minute. The solution was removed and the sample was taken out, dried & weighed. The amount of grease removed was weighed on a weighing scale.



Fig 17: Grease and wool



Fig 18: Greased wool yarn in flask

STABILITY TESTING : Store the Herbal Hair Conditioner, Synthetic Hair Conditioner and Ayurvedic Hair Conditioner at 37 degree celcius for 6 weeks and observe for any changes in color and viscosity.

RESULTS: 1) pH TEST:

HERBAL HAIR CONDITIONER :

Formulation 1	4.5
Formulation 2	4.0
Formulation 3	4.2
Formulation 4	4.61
Formulation 5	4.22
Formulation 6	4.15
Formulation 7	4.60
Formulation 8	4.60

SYNTHETIC HAIR CONDITIONER :

Formulation 1	3.2
Formulation 2	3.33
Formulation 3	3.2
Formulation 4	3.4
Formulation 5	3.26
Formulation 6	3.29
Formulation 7	3.5
Formulation 8	3.36

AYURVEDIC HAIR CONDITIONER :

Formulation 1	4.1
Formulation 2	4.13
Formulation 3	4.1
Formulation 4	4.08
Formulation 5	4.12
Formulation 6	4.2
Formulation 7	4.25
Formulation 8	4.23

2) DIRT DISPERSION TEST :

HERBAL HAIR CONDITIONER :

Formulation 1	No Foam
Formulation 2	No Foam
Formulation 3	No Foam
Formulation 4	Light Foam
Formulation 5	Light foam
Formulation 6	Light Foam
Formulation 7	Light Foam
Formulation 8	Light Foam

SYNTHETIC HAIR CONDITIONER :

Formulation 1	Light Foam
Formulation 2	Heavy Foam
Formulation 3	Heavy Foam
Formulation 4	Heavy Foam
Formulation 5	Heavy Foam
Formulation 6	Heavy Foam
Formulation 7	Heavy Foam
Formulation 8	Heavy Foam

AYURVEDIC HAIR CONDITIONER :

Formulation 1	No Foam
Formulation 2	Light Foam
Formulation 3	Light Foam
Formulation 4	Moderate Foam
Formulation 5	Light Foam
Formulation 6	Moderate Foam
Formulation 7	Moderate Foam
Formulation 8	Moderate Foam

3) MOISTURISING TIME DETERMINATION :

HERBAL HAIR CONDITIONER :

Type of Formulation	Time (in minutes)
Formulation 1	9
Formulation 2	9
Formulation 3	8
Formulation 4	8
Formulation 5	8.5
Formulation 6	8
Formulation 7	7
Formulation 8	7

SYNTHETIC HAIR CONDITIONER :

Type of Formulation	Time (in minutes)
Formulation 1	3
Formulation 2	3
Formulation 3	3
Formulation 4	2
Formulation 5	2.5
Formulation 6	2
Formulation 7	2
Formulation 8	1

AYURVEDIC HAIR CONDITIONER

Type of Formulation	Time (in minutes)
Formulation 1	4
Formulation 2	5
Formulation 3	4
Formulation 4	4
Formulation 5	5
Formulation 6	5
Formulation 7	5
Formulation 8	5

4) CLEANING ACTION :

HERBAL HAIR CONDITIONER :

Type of formulation	Weight of wool before	Weight of wool after
Formulation 1	5 gm	4.8 gm
Formulation 2	5 gm	4.8 gm

Formulation 3	5 gm	4.7 gm
Formulation 4	5 gm	4.76 gm
Formulation 5	5 gm	4.72 gm
Formulation 6	5 gm	4.77 gm
Formulation 7	5 gm	4.7 gm
Formulation 8	5 gm	4.72 gm

SYNTHETIC HAIR CONDITIONER :

Type of formulation	Weight of wool before	Weight of wool after
Formulation 1	5 gm	3.9 gm
Formulation 2	5 gm	3.7 gm
Formulation 3	5 gm	3.2 gm
Formulation 4	5 gm	3.6 gm
Formulation 5	5 gm	3.2 gm
Formulation 6	5 gm	2.57 gm
Formulation 7	5 gm	2.7 gm
Formulation 8	5 gm	2.2 gm

AYURVEDIC HAIR CONDITIONER :

Type of formulation	Weight of wool before	Weight of wool after
Formulation 1	5 gm	4.2 gm
Formulation 2	5 gm	4.22 gm
Formulation 3	5 gm	4.3 gm
Formulation 4	5 gm	4.28 gm
Formulation 5	5 gm	4.28 gm
Formulation 6	5 gm	4.27 gm
Formulation 7	5 gm	4.15 gm
Formulation 8	5 gm	4.19 gm

5) STABILITY TESTING : All the 3 types of Hair Conditioner i.e., Herbal hair conditioner, Synthetic hair conditioner and Ayurvedic hair conditioner did not show any change in colour and viscosity during stability testing.

Cleaning Action and Stability testing and they were proven to be safe and effective for use.

II. CONCLUSION :

From the above studies it is concluded that the hair conditioners show an excellent property of conditioning. The Herbal hair conditioner and Ayurvedic hair conditioners have no chemical ingredients which makes them safe to use for all types of scalps. The Synthetic hair conditioner has a cationic surfactant which gives good cleansing action. The 3 types of hair conditioners have different ingredients which provide strengthening, smoothening and protective effect which promote lustrous, shining and healthy hair. The hair conditioners were evaluated for their pH, Dirt dispersion test, Moisturising time determination,

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