



# Formulation and Standardization of Herbal Lotion: A Review

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## Abstract

The herbal cosmetics are those when natural herbs and their products used for their aromatic value in cosmetic preparation among consumers for herbal products triggered the demand for natural products and natural extracts in cosmetics preparations.

Lotions are liquid preparations meant for external application without friction. They are applied directly to skin with the help of some absorbent material, such as, cotton wool or gauze soaked in it. Formulation of aloe vera lotion, formulation of menthol lotion and aloe vera lotion with arrow root powder is prepared using different composition.

These formulations were evaluated with different evaluation parameters like Homogeneity, Appearance, After feel, Acid Value, pH measurement, Irritancy test, Viscosity, Accelerated stability testing, Subjective Properties, Spreadability, Type of emulsion test, Sensitivity Test, Washability Test, statistical analysis, In vitro permeation studies, Test for thermal stability, Determination of total fatty matter, Determination of water content, Patch test. The objective of this review is to compile the information of different herbal formulations of lotion and its evaluation. Herbal lotion formulations studied by many researchers and this information can be used by many researchers for novel herbal cosmetic formulations with new herbs.

**Keywords:** Herbal Cosmetic, Herbal Lotion, Aloe Vera, Menthol, Arrow Root Powder

## Introduction

Herbal Cosmetics, here referred as Products, are formulated, using various permissible cosmetic ingredients to form the base in which one or more herbal ingredients are used to provide defined cosmetic advantages only, shall be called as "Herbal Cosmetics". The herbal cosmetics are those when natural herbs and their products used for their aromatic value in cosmetic preparation among consumers for herbal products triggered the demand for natural products and natural extracts in cosmetics preparations.<sup>1</sup>

Lotions are liquid preparations meant for external application without friction. They are applied directly to skin with the help of some absorbent material, such as, cotton wool or gauze soaked in it. Lotions may be used for local action as cooling, soothing or protective purposes.

Containers: Lotions should be dispensed coloured fluted bottles in order to distinguish them from preparation meant for internal use.

Storage: Lotions should be stored in a well filled, well closed in an air tight container in cool place.<sup>2</sup>

Equipment:- Digital balance, pH meter, measuring cylinder, glass bowl, spoon, Brooke field viscometer.

## Formulation of Aloe Vera Lotion:

### Composition

Sr. No.	Ingredients	Quantity
1	Aloe vera gel	150ml
2	Coconut oil	120ml
3	Rose water	240ml
4	Vitamin E	14 capsule
5	Glycerin	150ml
6	Essential oil	4 drops
7	Arrowroot powder	39 gm

**Preparation before the formulation:** - Clean and sanitize your work area and all you packaging materials. It is suggested that you wear gloves, protective clothing and a hair net while preparing this recipe.

### Method of formulation

#### Formulation method of gel:-

- Collect raw material (aloe leaves).
- Wash leaf and remove base and tip of the leaf.
- Leaf is cut into section (Filleting).
- Extract mucilage part of the leaves into mixing jar.
- Heat it and add agar agar into the mixing jar.
- Grinding/Homogenization of Unpasteurized Juice
- Add Vitamin E and Pasteurize the mixer cool the mixer of aloe leaf
- Package the produced gel and Store it.

### Steps Used In Formulation of Gel

- Reception of raw materials- The Aloe vera leaves after harvesting were preferably transported to the processing place. The leaves should be sound, undamaged, mold/rot free and matured (3-4 years) in order to keep all the active ingredients in full concentration. Filletting operation- It was shown that the aloe gel, once extracted from the leaf, had greater stability than the gel left in the leaf. In order to avoid the decomposition of the biological activity, the filletting operation must be completed within 36 hrs. Of harvesting the leaves.
- Grinding/homogenization- The major steps in this process include crushing or grinding. The aloe gel fillets should be crushed and homogenized using a commercial high speed tissue crusher at room temperature (25°C). And add agar agar into the mixture.
- Addition of vitamin E- The unpasteurized aloe gel juice was fortified with vitamin E to improve the flavor of Aloe vera gel juice and to stabilize the juice. It is used for its antioxidant activity.
- Pasteurization- Treatment (at 85-95°C for 1-2 min) is an effective method to avoid the bad flavor and the loss of biological activity of the Aloe vera gel. Flash cooling- After pasteurization, the juice is flash cooled to 5°C or below within 10-15 sec. This is a crucial step to preserve biological activity of the Aloe vera gel.
- Storage- Relative humidity and temperature are two most important environmental parameters that affect product quality.

- **Formulation method of lotion:-**
- Measure the quantity of above formulated gel. Weigh all other ingredient used in formulation.
- Take a large glass or plastic mixing bowl.
- Add measured out gel of the aloe vera into the mixing bowl.
- Then add other ingredients of the formulation one by one like coconut oil, rosewater, vitamin E, glycerin, essential oil & arrowroot powder with measured quantity.
- Mix all the ingredient of the bowl in vigorously manner. Herbal lotion was prepared.<sup>3</sup>

### Formulation of Menthol Lotion:

#### Composition:

Sr. No.	Ingredients	Quantity (%)
1	Menthol	0.2
2	Powdered Tragacanth	0.5
3	Alcohol	9.0
4	Glycerine	4.5
5	Water	85.8

#### Procedure:

1. The required amount of each ingredient should be weighed/measured accurately.
2. Take 0.2ml of menthol and mix in 9ml alcohol with simultaneously addition of 0.5gm of tragacanth.
3. Add measured amount of glycerine and make volume upto 100ml with water.
4. Mix the contents thoroughly until a smooth mixture results.<sup>4</sup>

### Formulation of Aloe Vera Lotion:

#### Composition:

Sr. No.	Ingredients	Quantity
1	Bees wax	2gm
2	Shea Butter	2gm
3	Coconut Oil/Almond oil	2gm
4	Aloe Vera Gel (extract)	1gm
5	Mineral Oil/ Peppermint oil	10-12 drops
6	Perfume	1-2 drops

#### Procedure:

1. Take grated bees wax, add coconut oil and shea butter to it and keep on water bath for melting of all ingredients in double boiler.
2. Take a blender pour a above melted ingredients
3. Refrigerate for 15 mins
4. Again blend and add aloe vera gel
5. Again blend and in last add peppermint oil
6. Blend again and keep the lotion in air tight container

### Evaluation of herbal lotion:

#### 1. Homogeneity

The formulation were tested for homogeneity by visual appearance and by touch.

## 2. Appearance

The appearance of the lotion

## 3. After feel

Emolliency, slipperiness and amount of residue left after the application of fixed amount of lotion was checked.

## 4. Acid Value

Take 10gm of substance dissolve in accurately weighed in 50ml mixture of equal volume of alcohol and solvent ether. The flask was connected reflux condenser and slowly heated, until sample was dissolved completely. To this 1ml of phenolphthalein added and titrated with 0.1N NaOH, until faintly pink colour appears after shaking for 30sec.

Acid Value =  $n \times 5.61/w$

n = number of ml of NaOH required

w = weight of substance

## 5. pH measurement

The pH meter was calibrated using standard buffer solution. About 0.5gm of lotion was weighed and dissolved in 50ml of distilled water and its pH was measured using digital pH meter.

## 6. Irritancy test

Mark an area (1 sq. cm) on the left hand dorsal surface. The lotion was applied to the specified area and time was noted. Irritancy, erythema, edema, was checked if any for regular intervals upto 24hrs and reported.

## 7. Viscosity

Viscosity of the formulation was determined was brookfield or oswald viscometer at 100 RPM, using spindle no. 7 at temp 25°C. The determinations were carried out in triplicate and the average of three reading was recorded.

## 8. Accelerated stability testing

Accelerated stability testing of prepared lotion was conducted for 2 most stable formulations at room temp, studied for 7 days. The formulations were placed at 40°C  $\pm$  1°C for 20 days. Both formulations were kept at room temp and elevated temp and observed on 0<sup>th</sup>, 5<sup>th</sup>, 10<sup>th</sup>, 15<sup>th</sup> and 20<sup>th</sup> day for any change in color, phase separation etc.<sup>5</sup>

## 9. Subjective Properties

Consistency, feel on application and irritation parameters are determined.

## 10. Spreadability

Two glass slides of standard dimensions (20 × 5cm) were selected. The formulation was over one of the slide. The other slide placed on the top of the lotion such a that the formulation sandwiched between the two slides in an area occupied by a distance of 7.5 cm, alongside 100 gm weight was placed uniformly to form a thin layer. The weight was removed and the excess of lotion adhering to the slides was scrapped off. The two slides in a position were fixed to stand (45° angle) without slightest disturbance and in such a way that only the lower slide held firmly by the opposite fangs of the clamps allowing the upper slide to slip off freely by the force of weight tied to it. 60 gm of weight was tied to the upper slide carefully. The time taken for the upper slide to travel the distance of 5 cm and separate away from the lower slide under the direction of weight was noted. The experiment repeated for 3 times and the mean taken for three such dimensions was calculated. The results were recorded.

The Spread ability is calculated by using formula:

$$S = M \times L/T$$

Where,

S = Spread ability,

L = Length of glass slide,

M = Weight tied to the upper slide and

T = Time.

## 11. Type of emulsion test

Dye solubility and dilution test was conducted to determine the type of emulsion formed.

## 12. Sensitivity Test

A portion of lotion was applied on the forearms of 6 volunteers and left for 20 minutes. After 20 minutes any kind of irritation if occurred was noted.

## 13. Washability Test

A portion of lotion was applied over the skin of hand and allowed to flow under the force of flowing tap water for 10 minutes. The time when the lotion completely removed was noted.<sup>6</sup>

## 14. In vitro permeation studies

In vitro permeation studies of TRA lotions across rabbit skin were carried out using two-chambered Franz-type diffusion cells (manufactured “in house”) having a receptor phase of ~5 ml, 2 and a diffusional area of ~0.788 cm<sup>2</sup>. Adult rabbit skin was used for permeation studies at  $37 \pm 0.5$  C. Abdominal full thickness skin of male White New Zealand rabbit (3 - 4 kg weight) was carefully excised after sacrificing the rabbit. Subcutaneous fats and other extraneous tissues adhering to the dermis were completely removed and trimmed with forceps and scissor. The skin was cleaned with phosphate buffered saline (PBS) at pH 7.4 and stored in 500 ml normal saline in a refrigerator (18 – 20 C)

The skin was used within one week of excision. Sheets of the skin were cut to appropriate sizes 2 (~ 1 cm in diameter) and soaked overnight in the receptor solution (PBS). The membrane was then placed between the two compartments of the diffusion cells with epidermis side facing the donor compartment while the dermal side was bathed with PBS at pH 7.4 (receptor fluid). The donor compartment was filled with PBS at pH  $7.4 \pm 0.1$ . This pH is close to that of human skin. The receptor fluid was stirred with a magnetic stirring bar at 500 rpm, keeping the temperature at  $37 \pm 0.5$  C by means of a water jacket. Care was exercised to remove any bubbles between the underside of the skin and the solution in the receiver compartment. Vacuum grease was used to produce a leak-proof seal between the membrane and the two compartments of the diffusion cell, i.e., donor and receptor. Ultrasonic bath. To avoid evaporation from the compartments, the cell arm and donor compartment were covered with a parafilm. Constant mixing of the receptor phase was obtained with a magnetic stirrer placed in the receptor compartment. The diffusion cells were placed on a stirring-bed immersed in a water bath at  $37 \pm 0.05$  C, to maintain the temperature of membrane surface. After 24 hours, both chambers were cleared of PBS and the receptor compartment was immediately refilled with pre-thermostated PBS, while the skin remained intact. The donor compartment was charged with 1 ml of the lotion (test formulation). At time intervals of 5, 15, 30, 60, 90, 120, 180, 240, 360 and 480 min, 0.2 ml sample was drawn, using a micro-pipette, from receptor solution followed by addition of same volume of pre-thermostated receptor solution to maintain sink conditions. The samples were analyzed spectrophotometrically at 271 nm using UV/Vis spectrophotometer to obtain the amount of TRA permeated through rabbit skin after diluting with 1.8 ml PBS. Since skin shows great sample-to-sample permeability variations, each of these analyses was conducted in pentuplicate (n = 5). To construct a calibration curve, 500 mg of TRA was dissolved in PBS (10 ml) in 100 ml volumetric flask and the final volume made up to 100 ml by adding PBS to prepare stock solution. From this solution, dilutions of 10, 20, 30, 40, 50, 60, 70, and 80 µg/ml were prepared. The resultant dilutions were analyzed spectrophotometrically for UV absorbance' maximum UV absorbance of TRA was found at 271 nm. The linear equation of the constructed calibration curve was  $y = 0.022x - 2.021$  and correlation coefficient (R) of 0.998. Steady-state flux was determined from the slope of the linear portion of the cumulative amount of permeation (Q) versus time (t) plot. The input rate of TRA permeating across rabbit skin was determined as in Eq

$$\text{Input rate} = K_p \times C \times A \dots\dots\dots$$

Where,  $K_p$  is permeability coefficient,

C is donor amount (µg), i.e., amount of drug in the donor compartment and

A is the Franz cell area of 2 permeation (~0.788 cm<sup>2</sup>).

Enhancement ratio (ER) was calculated by dividing the flux of the test formulation by the flux of control formulation.

### 15. Statistical analysis

The receptor and donor compartments were filled with PBS at pH  $7.4 \pm 0.1$ . To remove air bubbles and preclude the development of air pockets in the receptor phase, PBS was degassed in an The results are expressed as mean  $\pm$  standard deviation (SD, n = 5). Statistically significant differences between various permeation data were determined using F-test, Fisher's least significant difference (LSD), analysis of variance (ANOVA) and multiple range tests at 95 % confidence level.<sup>7</sup>

16. Preference Test: The parameters of preference tests based on sensory evaluation were a scent, color, and sensation on the skin. The level of preference was assessed using a numerical scale, i.e. 5 = like extremely, 4 = like, 3 = neutral, 2 = dislike, 1 = dislike extremely.<sup>8</sup>

### 17. Test for thermal stability

Thermal stability of the formulation was determined by the humidity chamber controlled at 60- 70% RH and  $37 \pm 1$ oC.

### 18. Determination of total fatty matter

2g of the sample was weighed in a conical flask, added 25ml of dil. HCL (1% v/v) & refluxed. Poured this into the separating funnel and 50ml of ethyl ether were added in to it. The separating funnel was shaken well until two layers were separated. The aqueous layer was separated out and added 50ml portion of ether twice. All the ether extracts were combined and filter through the filter paper containing dried sodium sulphate on it. Distilled off the ether (filtrate) & dried the material remaining in the flask at temperature  $60 \pm 2$ oC to constant mass.

Calculation

$$\text{Total Fatty Matter\%} = 100 \times M1/M2$$

Where, M1= mass in gram of residue

M 2= mass in gram of material taken for test

### 19. Determination of water content

10g of the material was weighed and transferred it into the flask. 200ml of toluene and few pieces of pumice stone was added and connected the apparatus with condenser. The flask was heated until toluene was begin to boil and refluxed. When the H<sub>2</sub>O was distilled over source of heat was removed.

Calculation

$$\text{Water \% by mass} = V \times D \times 100 / M$$

Where, V = volume of water in ml at room temperature collecting in receiving tube

D = density of water at room temperature

M = Mass in gm of the material taken for the test

### 20. Patch test

About 1-3gm of material to be tested was placed on a piece of fabric or funnel and applied to the sensitive part of the skin e.g. skin behind ears. The cosmetic to be tested was applied to an area of 1sq.m. of the skin. Control patches (of similar cosmetic of known brand) were also applied. The site of patch is inspected after 24 hrs. As there was no reaction the test was repeated three times. As no reaction was observed on third application, the person may be taken as not hypersensitive.<sup>9</sup>

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