



FORMULATION AND EVALUATION OF HERBAL SOAP BY USING MORINGA OLEIFERA AS MAIN ACTIVE CONSTITUENTS

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Abstract

The majority of commercial soaps include chemicals and synthetic ingredients that may be irritating or even damaging to the skin. Human's skin, which needs special treatment for healing, improved skin tone, and the appearance of glowing health. Herbal soaps found in nature are another viable option. Herbal products have double meaning: first, they are used as cosmetics for body care, and second, the presence of photochemical and botanicals in them results in naturally healthy skin. Herbalism and the usage of herbal products are now popular trends. Indian herbs are the most abundant source utilised in the cosmetic industry. As more people know the health benefits and cost-effectiveness of herbal products, their use is growing rapidly all across the world.

So, In this research, we used the cold process technique to create a herbal soap. In order to make herbal soap namely (F-1 & F-2), coconut oil, Glycerine, Moringa oleifera extract, C. sinensis peel Powder, and sodium hydroxide (lye) was used, and the various extracts were afterwards combined into the primary saponification process. After completion of the herbal formulation, it was tested for its pH, moisture content, foaming index, foam retention time, and high temperature stability, etc. Various studies found that, these herbal plant extracts proven to possess anti-bacterial activity, anti-inflammatory activity, anti-fungal activity, etc. The findings for the manufactured herbal soap reveal that these soaps are cost-effective, convenient, generate nice foam on application and do not exhibit any skin irritation.

Introduction

The **skin** is the body's largest organ and its exposure to the environment makes it vulnerable to a wide range of skin diseases/ailments (hives, eczema, psoriasis, warts, acne, and other skin conditions). In order to avoid skin problems, it's important to keep the body's largest organ (and one that's constantly exposed to the elements) clean and free of any microbes that could be floating about outside (1,2). Skincare herbal formulations that fight fungi, bacteria and microbes may be made from any number of plant components, including the stem, leaves, roots, bark, flower, and fruit. These pharmaceuticals are often produced in the form of a cream, lotion, gel, soap, and ointment when they are intended for topical use. One of the most popular formulations for skincare and the treatment of skin ailments is herbal soap (3,4).

Soap is a salt of fatty acids that may be found in many household cleaning and personal care items. Soaps have several uses in the home, the most common of which are washing, bathing,

and general cleaning (5,6). When triglyceride fats are hydrolyzed into free fatty acids, they may interact with alkali to make crude soap, a process known as saponification (7). In most cases, soaps are manufactured using the melt-and-pour process, the hot press method, or the cold press method. In the manufacture of soap, various oils such as coconut oil, palm kernel oil, olive oil, castor oil, sunflower oil, rice bran oil, and soybean oil are among the oils that are used. The quality of the soap may be determined by the kind of oil that was used, the kind of alkali that was used, the soap's hardness, the height of its froth, the amount of moisture it contained, and the total fatty matter. Various studies showed that Soaps sold in stores often include harmful compounds including mercury, aluminium, barium, bis-phenol, plastics, and other substances that are absorbed by the skin and then by the body's organs via the lungs and the digestive tract through inhalation which shows various side effect and there are a lot of chemically based soap on the market, and using them often might cause skin irritation and resistance among infections. The primary advantages of items derived from herbal sources are their accessibility, low cost and safety in comparison to chemically produced alternatives (2,3,6,8). In the worst case, it might lead to a dangerous type of diseases. For this reason, in the current study, we can develop a herbal soap using various herbal extracts. That is believed to have no or little negative effects.

Herbal soaps that include herbal extracts should have considerable antibacterial, antimicrobial, anti-aging, anti-oxidant, and antiseptic action, promote skin conditioning, have a great foam, have a pleasant aroma, and be soft on the skin. Herbal soaps don't include any man-made additives and chemicals such synthetic fragrances, flavours, fluoride, etc (3,6). **Herbs** as from beauty of nature have been used to treat a wide range of skin problems, from the very moderate to the really serious. The use of various herbal medicines for the treatment of skin infections has been investigated by many traditional medical systems, including the Ayurvedic, Siddha, and Unani systems of medicine. Eighty per cent of the world's population relies on traditional medicine for their primary care, as verified by the World Health Organization. The use of natural remedies is more common in developing world (3). The ever-increasing interest in herbal treatments has led to a growth in the market's desire for a greater quantity of herbal items, which in turn has led to increased manufacturing of herbal goods.

Herbal pharmaceuticals are in more demand than their synthetic counterparts for a variety of reasons, including the following (9-11):

- Minimal Adverse Effects
- Enhanced safety and effectiveness
- Easily accessible
- Improved compatibility with other ingredients
- significant curative effect
- Increased tolerability for all skin tones
- Cost effective

Ingredient of soap base formulation & its role/uses (7)

Various Ingredients used in the preparation of soap base listed below:

S.No.	Ingredient	Role/ use
1.	Sodium hydroxide	Lye
2.	Coconut oil	Anti-ageing, soothe skin
3.	Distilled water	Aqueous vehicle

Table- 1: List of soap base ingredients& their role

Ingredients of herbal soap formulation& its role/ uses

Various Ingredients used in the preparation of herbal soap listed below:

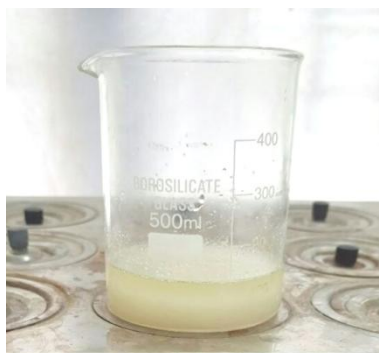
S.No.	Material/Ingredients	Role/uses
1.	Soap base	Cake formation
2.	Moringa oleifera bark charcoal & leaves extract	Vitamin-A & C, Anti-inflammatory
3.	Citrus sinensis powder	Vitamin-C
4.	Cinnamomum zeylanicum bark extract	Skin whitening agent/ improve skin tone
5.	Sapindus mukorosissi powder	Exfoliating property & Natural body cleanser
6.	Glycerine	Moisturizing agent& solvent

Table- 2: List of herbal soap

Applications of

1. Soap base:

- It is used for
- It is make



ingredients

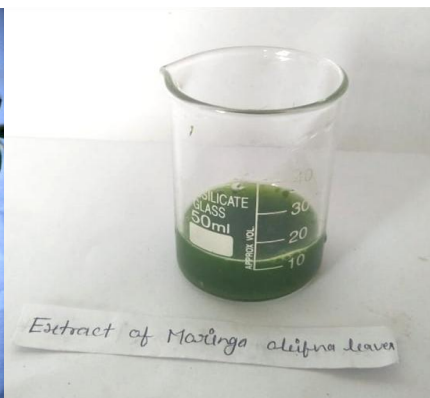
Ingredients

cake formation.
smoothness of soap (4).

Fig- 1: Soap



base



2. Moringa oleifera bark charcoal:

- It is used as preventing acne breakouts on skin.
- It is also helps in removing blemishes, dark spots, pimples and blackheads.
- It is used for skin whitening agent (12-13).

**Fig- 2:
oleifera**



**Moringa
bark& their
charcoal**

3. Moringa oleifera leaves extract

- It possess anti-bacterial, anti-inflammatory and anti-oxidant activity.

- It also possess antiseptic property. Moringa contains Vitamin A and also contains vitamin C, which helps to recover damaged skin cells.
- Moringa oil may also assist to enhance the appearance of your skin. Dark spots, acne, and other skin problems may leave your face with unwanted markings and scars. Moringa may help to smooth these characteristics and give you a radiant, even appearance(12-13).

Fig- 3: Moringa oleifera leaves extract

4. Cinnamomum zeylanicum bark powder:

- It is used as skin lightening agent& provide glowing skin.
- It is very helpful in restoring the skin's natural colour and improve skin tone.
- Cinnamon bark possess anti-microbial, anti-oxidant and anti-inflammatory activity, etc. This plant balances the body's Vata and Pitta energies (14-16).



Fig – 4: Cinnamomum zeylanicum bark powder

5. Citrus sinensis peel powder:

- It is used as antioxidant.
- It is used as skin lightening agent.
- It is helps reducing the pigmentation and acne.
- It is used for make skin look smooth and soft (17).



Fig – 5: Citrus sinensis peel powder

6. Sapindus mukorosissi powder:

- Reetha is act as a natural body cleanser.
- It possess exfoliating property.
- It is used for the clean and smooth skin.
- It is used for reduce the acne and pimples (18).



Fig- 6: S. mukorosis powder

7. Glycerine:

- It is used as moisturizing agent.
- Glycerine is used as a humectant in soap. In other words, glycerine helps assure that your skin retains its natural moisture in order to prevent it from harm caused by dryness. Humectants, such as glycerine, help your skin to breathe while without forming a barrier.
- Glycerine also used as a solvent(5, 19).

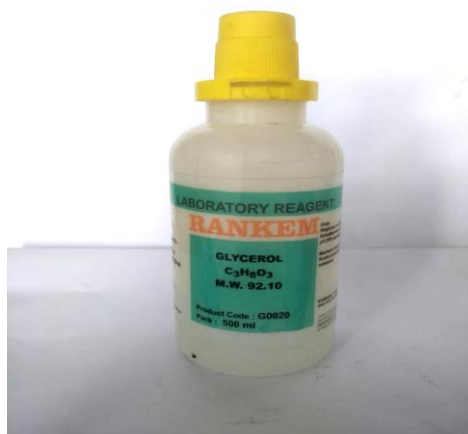


Fig- 7: Glycerine

8. Coconut oil:

- Coconut oil may be used to soothe inflammatory skin, decrease redness, and moisturise the skin. It is rich in fatty acids that nourish and protect your skin and the oil used for relief crack skin.
- It is promoting wound healing and Coconut oil may help minimise the stretch marks.
- Coconut oil-based soap contains antibacterial, antifungal, anti-inflammatory properties, anti-ageing properties. it may help with a variety of skin ailments.
- Coconut oil is moisturising enough to treat especially the most delicate skin.
- It may act as lather enhancer (5-7,11,17).

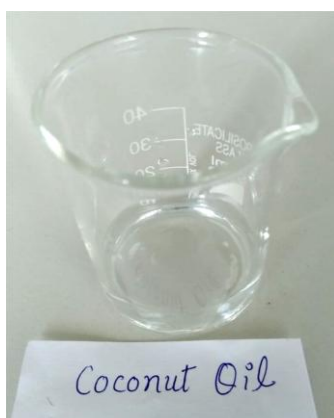


Fig-8: Coconut oil

Preparation of moringa oleifera bark charcoal

Collection of Plant Material

Common name: Sahjan.

Family:Moringaceae.

Moringa oliefera barks are obtained in the month of February 2023. The barks are collected from the local area of Lucknow, India.

The Moringa oleifera is usually known in rural area as Sahjan and M. oeilfera is used in formulation of herbal soap for the purpose of Vitamin-A & C and anti-inflammatory (12-13).

Preparation of charcoal

- First of all collect the Moringa oleifera bark, wash and dry in the tray dryer after drying the bark is removed from the tray dryer.
- Then dried bark is filled in crucible and put in Muffle Furnance at 428°C for 15 minutes.
- After burning the bark, crucible is removed from the muffle furnance.
- The bark coal is crushed using mortar pestle and then charcoal is sieved.
- After sieving, obtained fine charcoal powder.
- charcoal powder was collect in the suitable container and store it.

IMAGES


Preparation of Moringa oleifera bark charcoal			
			
Fresh bark of M. oleifera	Dried bark of M. oleifera	Bark place in Muffle F.	After burning bark
			
Burn bark charcoal	Crushing of charcoal	Sieving of charcoal	M. oleifera Charcoal powder

Fig- 9: Preparation of charcoal

Extraction of moringa oleifera leaves

Collection of material

Common name: Sahjan.

Family:Moringaceae.

Moringa oleifera leaves are obtained in the month of February 2023. The barks are collected from the local area of Lucknow, India.

The Moringa oleifera is usually known in rural area as Sahjan and It is used in formulation of herbal soap for the purpose of Vitamin-A & C and anti inflammatory (12,13).

Method of extraction

- First of all collect the Moringa oleifera branches from the local area of Lucknow, leaves separate from the branches and wash it.
- Leaves pour in the grinder and add sufficient amount of distilled water and grind it.
- After the grinding Moringa oleifera extract is filter using the filter paper.
- Then Moringa oleifera extract collect in a suitable container and store it.

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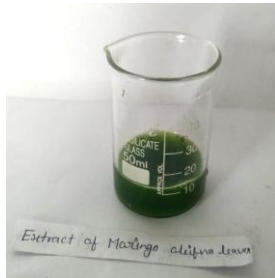
Extraction of Moringa oleifera leaves		
		
Branches of M. oleifera leaves	Separate the M. oleifera leaves	M. oleifera leaves pour in grinder
		
Grinded leaves	Filter the extract	Extract of M. oleifera leaves

Fig- 10: Extraction of Moringa oleifera leaves

Extraction of Cinamomum Zeylanicum bark powder

Collection of material

Common name: Darchini.

Family:Lauraceae.

Cinnamomum zeylanicum barks are obtained in the month of February 2023. The barks are collected from the local market of Lucknow, India.

The C. zeylanicum is usually known in rural area as Darchini (20)and It is used in formulation of herbal soap for the purpose of skin whitening& improve skin tone.

Extraction method

- First of all collect the C. zeylanicum bark from the local market of Lucknow.
- The bark cut into uniform sized.
- Small parts of bark pour in the grinder and grind it.
- After the grinding then C. zeylanicum bark powder obtain.
- Weigh C. zeylanicum powder added in sufficient amount of distilled water in a beaker and put on the heating mantle at 40 °C for 15 minutes and Mixture is boiled.
- After the boiling then filter it with the help of filter paper.
- Collect the C. zeylanicum bark extract in a suitable container and store it.

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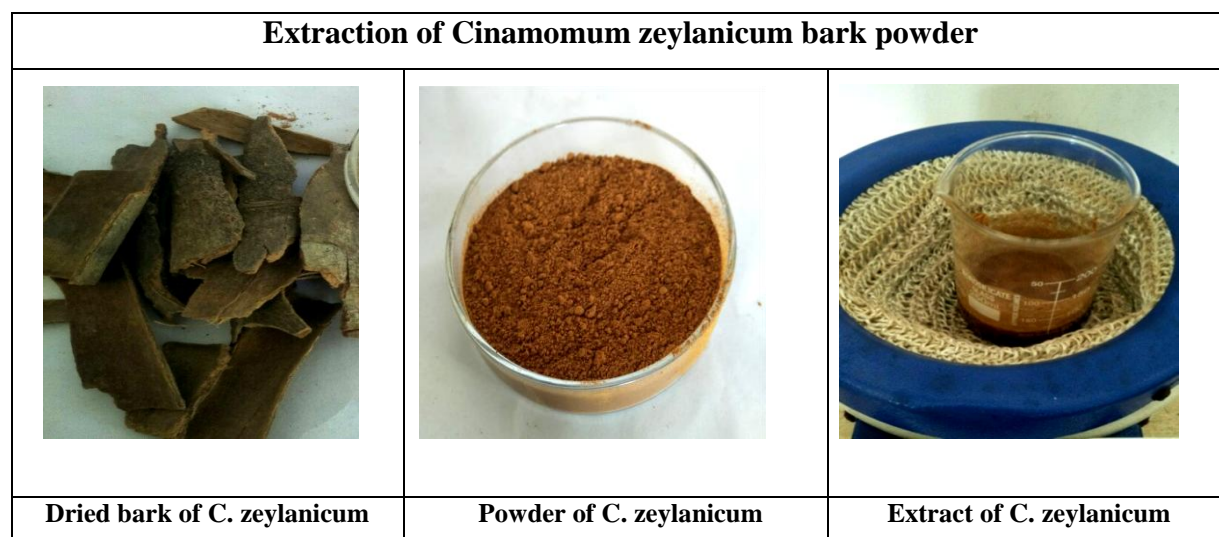


Fig- 11: Extraction of Cinamomum zeylanicum bark powder

Preparation of citrus sinensis peel powder

Collection of the material

Common name:Orange.

Family:Rutaceae.

Citrus sinensis are obtained in the month of February 2023. The fruits are procured from the local market of Lucknow, India.

Citrus sinensis is usually known as Orange. The Citrus sinensis peel powder used in formulation of herbal soap as Antioxidant& also treat acne & spots (17).

Preparation of powder

- First of all collect the Citrus sinensis in local market, Lucknow.
- Separate the peel from the fruits and cut it into small sized (pieces).
- The small piece of peel are washed place in the tray dryer for drying.
- After drying the peel removed from the tray dryer.
- Then dried peels poured in the grinder and grind it.
- After the grinding obtain Citrus sinensis peel powder and then collect the powder in a suitable container and store it.

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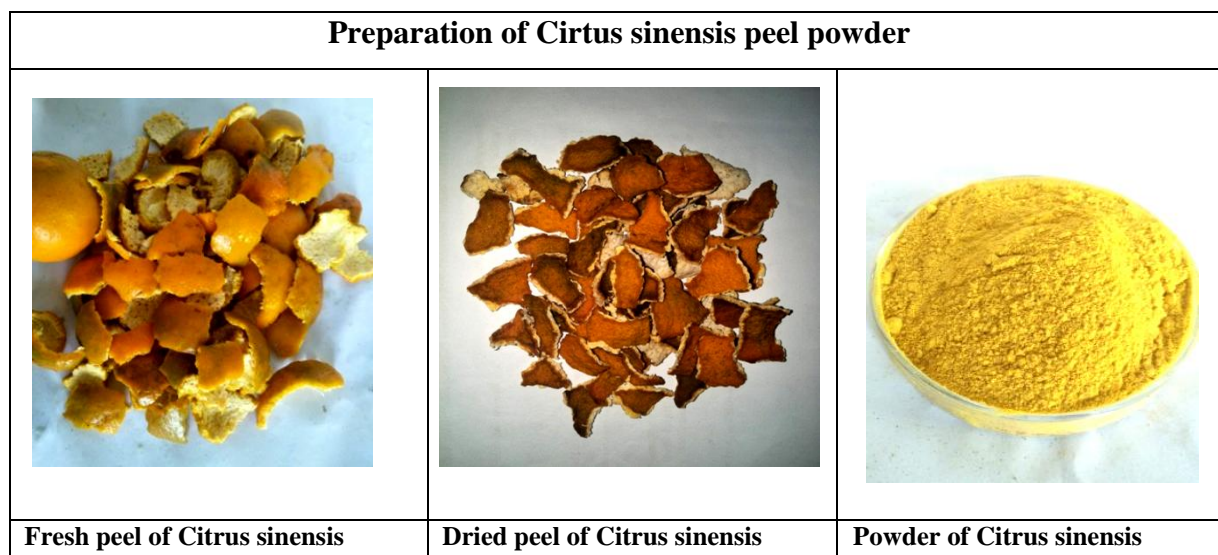


Fig- 12: Preparation of C. sinensis peel powder

Preparation of soap base (7)

S.No.	Ingredients	Quantity
1.	Coconut oil	75 ml
2.	Sodium hydroxide	13.20 gm
3.	Distilled water	24ml

Table- 3: Formulation of soap base

Procedure:

- For preparing the soap base, first of all take 75 ml coconut oil in a 500 ml beaker.
- Put the coconut oil in the water bath and stir-boil it until a strong consistency forms at a temperature between 40 to 45 °C.
- Then take 13.20 gm sodium hydroxide dissolve in 24 ml distilled water in a another beaker and mixed properly.
- After preparing, this solution was added slowly in coconut oil mixture with constant stirring.
- The mixture was boil at 40–45 °C until base consistency is attained and then this mixture was used as a soap base.

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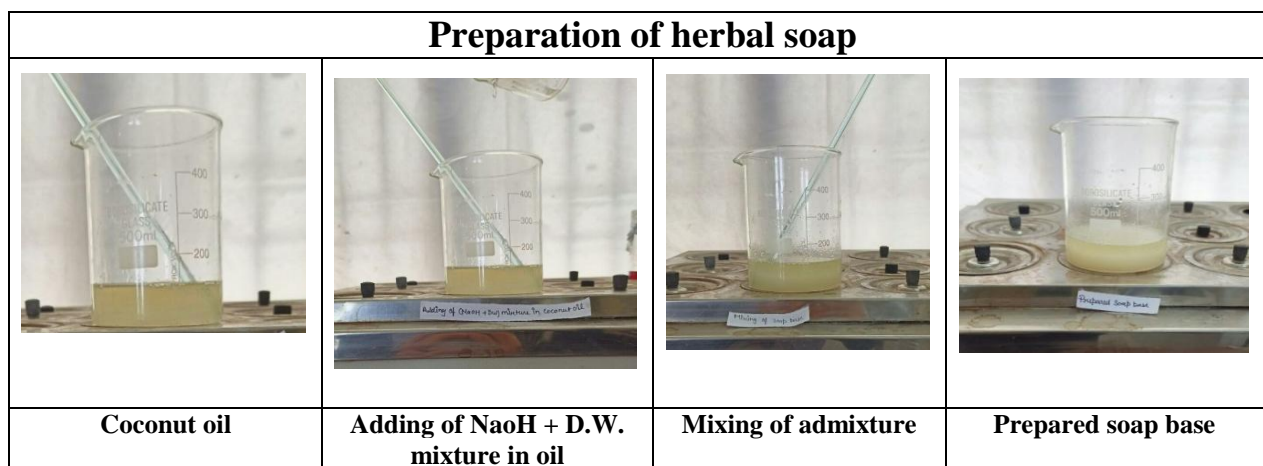


Fig- 13: Preparation of soap base

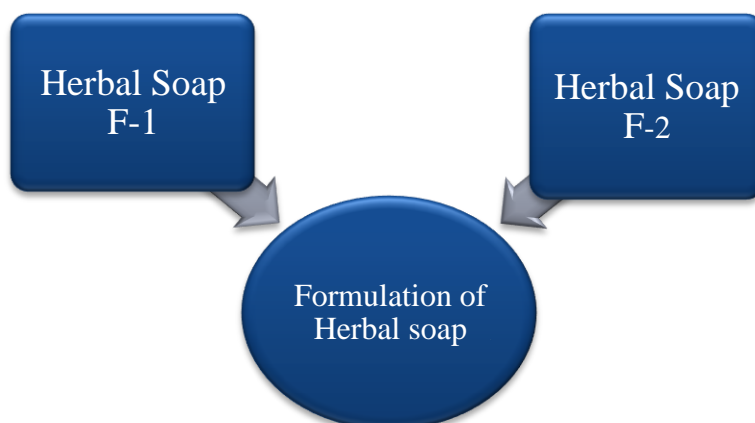
Formulation of herbal soap

We prepared two types of Herbal Soap formulation:

Fig- 14: Types of Herbal Soap

Formulation of herbal soap F-1

S. No.	Ingredients	Quantity
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1.	Soap Base	50 gm
2.	Moringa oleifera bark charcoal	2gm
3.	Citrus sinensis peel powder	2gm
4.	C. Zeylanicum bark extract	1gm
5.	Sapindus mukorosissi powder	0.5gm



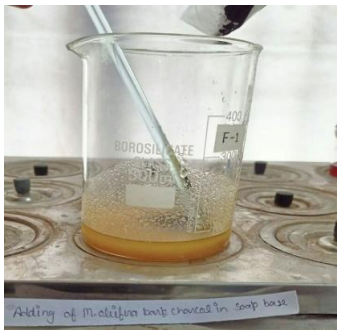
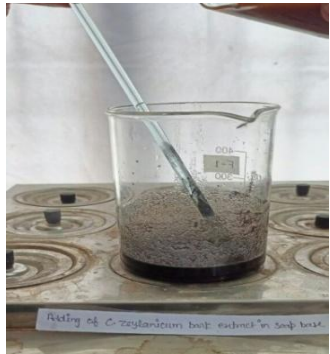
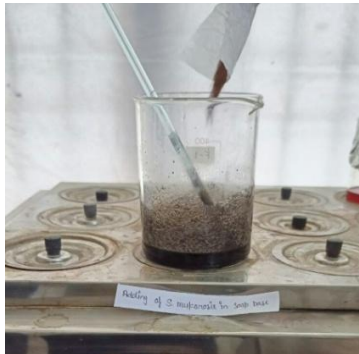



Table- 4: Formulation of Herbal Soap F-1

Procedure:

- Take 50 ml of soap base in a beaker and put on water bath at 45°C.

- Then add the all ingredient (M. oleifera bark charcoal, C. sinensis peel powder, C. zeylanicum bark extract, S. mukorosissi powder) with continuous stirring .
- Boil the mixture on the water bath at 45°C and soap mixture is prepared.
- Prepared soap mixture is filled in moulds and mould is put in the refrigerator for 15 min.
- After solidification cut the soap mould using cutter or blade and then obtained herbal soap.

Images of herbal soap F-1

		
<p>Soap Base</p>	<p>Adding of C. sinensis peel powder</p>	<p>Adding of M. oleifera bark charcoal</p>
		
<p>Adding C. zeylanicum bark extract</p>	<p>Mixing and adding S. mukorosissi fruit powder</p>	<p>Prepared soap mixture F-1</p>
		
<p>Filling of Prepared soap</p>	<p>After solidification prepared soap</p>	

mixture in mould	
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Fig- 15: Preparation of herbal soap F-1

Formulation of Herbal Soap F-2

S. N.	INGREDIENTS	QUANTITY
1.	Soap Base	60 gm
2.	Moringa oleifera leaves extract	10 ml
3.	Citrus sinensis peel powder	2 gm
4.	C. Zeylanicum bark extract	1 ml
5.	Sapindus mukorosissi powder	0.50 gm
6.	Glycerine	10 ml

Table- 5: Formulation of Herbal Soap F-2

Procedure:

- Take 60 ml of soap base in a beaker and put on water bath at 45°C.
- Then add the all ingredient (M. oleifera leaves extract, C. sinensis peel powder, C. zeylanicum bark extract, S. mukorosissi powder and glycerine) with continuous stirring in to soap base.
- Boil the mixture on the water bath at 45°C and soap mixture is prepared.
- Prepared soap mixture is filled in soap moulds and mould is put in the refrigerator for 15 minutes.
- After solidification cut the soap mould using cutter or blade.
- Then obtained herbal soap.

Images of herbal soap F-2

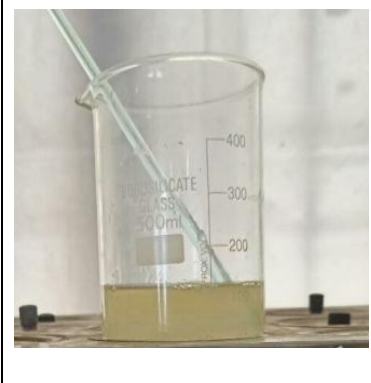





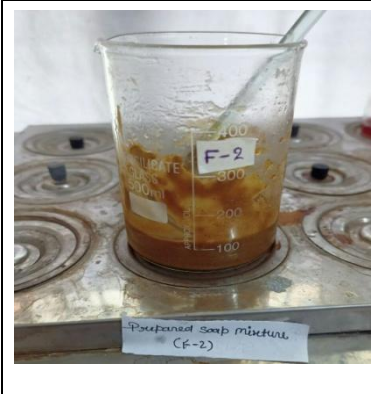


		
<p>Soap Base</p>	<p>Adding of <i>C. sinensis</i> peel powder</p>	<p>Adding of <i>M. oleifera</i> leaves extract</p>
		
<p>Adding <i>C. zeylanicum</i> bark extract</p>	<p>Mixing and adding <i>S. mukorosis</i> fruit powder</p>	<p>Adding Glycerine with stirring</p>
		
<p>Prepared soap mixture F-2</p>	<p>Filling of Prepared soap mixture in mould</p>	<p>After solidification prepared soap</p>

Fig- 16: Preparation of herbal soap F-2

Image of Prepared Herbal Soap F-1 and F-2



Fig- 17: Prepared herbal soap

Evaluation of Herbal Soap(4,21-26)

In order to verify the efficacy and quality of the final formulations, the following physicochemical characteristics were tested such as colour, aroma, pH, clarity, dirt dispersion, foam height, foam retention, skin irritation, and saponification value, etc. The herbal soap formulation was tested using the standard approaches.

1. **Colour-** When visualising the herbal soap, a white background was used so that the colour could be determined and so that the clarity of formulations F-1 and F-2 could be seen.
2. **Odour/Aroma-**An evaluation of the odour of formulations F-1 and F-2 we used two different methods. The first method included heating the sample on a hot plate. The second method involves inhaling a direct sample by five to six different people, including both males and females.
3. **Shape-**Evaluation of organoleptic properties, such as shape and clarity, was carried out by sensory and visual examination.
4. **pH-**In order to determine the pH or hydrogen ion concentration, we must prepare 1% of the sample. We used a pH 4 and pH 7 buffer solution to calibrate the pH metre. Take pH readings at room temperature, just as the reference solution. Record and note the pH level of the solution that was used to calibrate the metre and the electrode. The final readings were determined by taking an average of the three different readings that were obtained from each of the samples after they were each examined three times.

5. **Dirt dispersion**-First, we prepare a 1% sample solution that was taken in a measuring cylinder and added two drops of ink in to the sample solution. The measuring cylinder was then shaken ten times while being covered by a hand. The ink is present concentrate in the foam is considered to be of low quality, investigate that. The remaining dirt particles are then found in the water section. The amount of ink found in the foam was noticed.
6. **Wetting time**-We take a piece of cotton fabric, cut it into a disc shape with a diameter of one inch, and then measure the sample's weight so that we may determine how long it took the sample to get wet. The next step is to prepare a sample that has been diluted (a 1% solution), as well as a piece of cotton cloth to lay on top of the sample. The disc made of fabric was allowed to float freely on top of the 1% sample solution. The amount of time that it took for the fabric disc to go from floating to sinking was carefully recorded and referred to as the wetting time. A higher wetting efficiency is associated with a shorter time to sink.
7. **Foam forming ability**-The Cylinder Shake Method was utilised to determine the Foaming ability. First, in a 100 ml measuring cylinder, we put 50 ml of a 1% sample solution and shaken vigorously 10 times. After shaking for 1 minute, we measured the height of the foam that had formed and recorded the total volume of foam.
8. **Foam stability**- The Cylinder Shake Method was utilised to determine the Foaming ability. First, in a 100 ml measuring cylinder, we put 50 ml of a 1% sample solution. The cylindrical container was covered up with the use of the hand and shaken vigorously 10 times. The volume of the foam after ten minutes was calculated.
9. **Moisture content**-About 10 gram of the material were heated in a hot air oven at 100 to 105 degrees Celsius for an hour. After that deducted the true weight of the tarred china dish from the total weight of the sample and dish. The weight of the material was recorded, and the method for calculating the percentage of the moisture content that can be found in it is shown below formula.

$$\text{Moisture content} = (\text{Difference in weight/initial weight}) \times 100$$

10. **Skin Irritation test**-For the determination of irritancy test, Use the soap sample on clean skin to observe for signs of irritation, such as redness, burning, or itching and 24 hours, the situation was monitored.

Results of Evaluation Parameter

S.No.	Parameters	F-1	F-2
1.	Colour and clarity characterization	Black	Yellow
2.	Odour	Characteristic	Characteristic
3.	Shape	Rectangle shape	Rectangle shape
4.	Ph	8.06	8.47
5.	Dirt dispersion	Good	Best
6.	Wetting time	03:50 sec	30 sec
7.	Foam forming ability	7.5 cm	10 cm
8.	Foam stability (after 10 min)	1 cm	3 cm
9.	Moisture content	6.6%	4.5%
10.	Skin irritation test	No	No

Table-6: Evaluation result of herbal soap formulation

Conclusion

In this work has attempted to make and evaluate herbal soap (F-1 & F-2) using cold process method. It possess the necessary medicinal characteristics, provide soothe skin, and tackles a range of skin disorders. Some herbal/natural ingredients, such as *M. oleifera*, *C. sinensis* peel, *C. zeylanicum* bark, *S. mukorosissi* was used to make herbal soap. The prepared formulation has excellent physical properties. According to the results of several tests, the formulation has great foaming properties, pH, moisturizing property, etc. The produced herbal soaps show no any side effect. Naturally *M. oleifera* leaves and bark have good anti-microbial, anti-fungal, anti-inflammatory and also have used to reduce acne, dark spots and other skin problems. The other ingredients like *C. sinensis* peel, *C. zeylanicum* bark and coconut oil, etc were proven to be safe and harmless, and is rather useful in terms of providing skin benefits including its moisturising impact and cleansing the skin. Thus, the prepared soaps' potential use in treating skin infections may be investigated further.

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