The Resurgence of Natural Cosmetics: A Comprehensive Review of Herbal Beetroot Lip Balm

A Review Article

Submitted

To

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Submitted by

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2025 - 2026

CERTIFICATE

This is certify that the review article entitled **"The Resurgence of Natural Cosmetics: A Comprehensive Review of Herbal Beetroot Lip Balm"** represents the bonafide work of **Mr. Rohit Sanjay Jadhav** submitted in partial fulfilment of the requirement for the degree of Bachelor of Pharmacy. The work was carried out in Dr. Vedprakash Patil Pharmacy College, Ch. Sambhajinagar, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere Raigad, Under the guidance of **Mrs. Arti khamat (Assistant Professor).** The review article is now ready for evaluation.

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Date: **Mrs.Arti Khamat**

Place: Chh. Sambhajinagar **Guide**

DECLARATION

I, the undersigned **Mr. Rohit Sanjay Jadhav,** Student of B. Pharm VII Semester, of Dr. Vedprakash Patil Pharmacy College, Ch. Sambhajinagar hereby declare that the review article entitled **"The Resurgence of Natural Cosmetics: A Comprehensive Review of Herbal Beetroot Lip Balm"** has been carried out by me under the supervision and guidance of **Mrs. Arti Khamat (Assistant Professor),** Faculty of the Dr. Vedprakash Patil Pharmacy College, affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere Raigad, during 2025-26. The content presented in the review article is the literature survey and the same is not submitted to any other college or university for award of any degree.

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Abstract:

The primary focus of this study is the creation and assessment of a natural lip balm that uses beetroot juice as its primary ingredient. Beetroot, renowned for its vibrant colour and potential health advantages, is a promising ingredient in cosmetics because of its natural pigments and moisturising properties. The first step in the research process is creating a lip product formulation that includes beetroot juice and other natural components. The formulation of the lip balm is then assessed in terms of its physical, chemical, and sensory properties. By examining a number of factors, such as colour, pH, texture, scent, and moisturising effectiveness, the product's overall quality and consumer appeal are evaluated. Additionally, stability tests are performed to guarantee the lip balm's longevity and shelf life under various storage circumstances. In addition to offering insights into the possible advantages of using beetroot juice in lip care products, the study's findings hope to support the rising demand for sustainable and natural cosmetics. In the end, the study aims to provide a competitive substitute for traditional lip balms, encouraging environmentally responsible and health conscious cosmetics.

Keywords: Beta vulgaris, Betalains, Herbal Cosmetics, Lip Care, Natural Antioxidants, Cosmeceuticals.

Introduction:

The skin on the human lips is anatomically distinct from the rest of the body; it lacks sweat glands and hair follicles, possesses a thinner stratum corneum, and contains very little melanin. Consequently, lips are highly susceptible to environmental stressors such as UV radiation, dry air, and cold temperatures, leading to chapping, cracking, and hyperpigmentation.Conventional lip balms and lipsticks often rely on synthetic dyes (coal tar derivatives), parabens, and mineral oils. Prolonged use of these ingredients has been linked to allergic contact dermatitis and, in some cases, heavy metal toxicity. This has necessitated the development of "cosmeceuticals"—products that combine cosmetic elegance with pharmaceutical benefits. Herbal beetroot lip balm has emerged as a frontrunner in this category, leveraging the natural pigmentation and antioxidant properties of the beetroot tuber.

Cosmetics are materials or objects that are applied to the body to improve appearance. The application of cosmetics is constantly expanding. Important factors that promote the use of cosmetics include growing urbanisation, lifestyle advancements, and the habit of posting pictures on social media. People's awareness of their appearance has grown as a result of an increase in working women and social media usage (Bellis, 2017). The sale of cosmetics, particularly lip cosmetics, rises in emerging nations due to the growing number of young people and increased disposable income (P&S Market Research, 2018). The growth of the cosmetics sector is threatened by the presence of dangerous substances in them. Customers are becoming more and more worried about choosing cosmetics. Manufacturers strive to produce environmentally friendly and user-safe cosmetics. The global market for lip care products was introduced by Global Industry Analysts, Inc. (GIA) due to growing demand for natural and organic lip care products, growing awareness of the need to shield the lips from excessive sun exposure, and new product advancements. has started the worldwide lip care product industry, which is expected to grow to a value of US$2 billion by 2020. (International Business Analysts, 2015) Since ancient times, people have coloured their lips, and wearing lipstick has been more and more common Colour, texture, and shine, variations,

Additionally alternatives have grown and changed. Examples include lip balm, lip jelly, and other like goods. Lips and skin have different structural characteristics. Generally speaking, the top 15–16 layers of the skin's corneum are there mainly for protection. The top corneum layer of the lips is relatively thin and only consists of three to four layers when compared to normal facial skin. The skin of the lips has a small number of melanin cells. This makes blood vessels under the skin of the lips more visible, providing the lips a beautiful shade of pink. The surface of the lip’s lacks sweat glands and hair follicles. It consequently lacks the bodily lipids and perspiration that shield it from the weather (Kuduetal.,2015). Its primary the goal is to shield the skin from damaging environmental factors and prevent it from drying out. However, some lip balms have unfavourable side effects. For instance, lip balms that contain phenol, menthol, and other inferior compounds may be detrimental to the lips. Among the cosmetic products applied to the lips are lipsticks, lip balms, lip jellies, lip salves, lip gloss, and lip rouge. These compositions give the lips a glossy texture and a beautiful hue. Lip rouge is an alternative to lipstick. They are nearly liquid or semisolid in nature. Developing a medicated lip rouge with noisome acyclovir to treat recurrent herpes labialis was the aim of the study. The goal of this study was to create a formulation that might effectively treat cold sores by providing a greater concentration of the medication in the dermal tissue. The formulation may be able to deeply penetrate the lip barrier and release the medication at the site of action since it is encapsulated inside a lipophilic noisome carrier.

LITERATURE REVIEW:

1. **Bobade and Dhotre (2025) and Grace et al. (2024)** focus on the general formulation and evaluation of herbal lip balms, emphasizing that synthetic formulations may contain harmful chemicals that can cause allergic reactions or long-term damage (Source 1). They advocate for using natural ingredients like beeswax, coconut oil, and other herbal extracts (aloe vera, turmeric) for their anti-inflammatory, antibacterial, and moisturizing effects (Source 1).

2. **Pawar et al. (2021)** also address the formulation and evaluation of herbal lip balms, reinforcing the consumer preference for safe, non-toxic alternatives derived from plant sources.

3. **Nahak et al. (2025) and Deshmukh et al. (2023)** specifically investigate beetroot extract/powder as a natural chromophore for herbal lipstick and lip gloss, respectively, aiming to replace artificial shades associated with health risks (Source 2, 5). Nahak et al. utilize the powerful dispersion method for lipstick and evaluate the stability of formulations using beetroot as the natural colorant (Source 2).

4. **Gaikwad et al. (2023) and Sari et al. (2021)** directly apply beetroot (juice or extract) as the natural coloring agent in lip balm and blush preparations, highlighting its rich color as a replacement for synthetic dyes (Source 4, 8).

5. **El-Beltagi et al. (2022)** provide a detailed phytochemical profile of Beta vulgaris, identifying it as a rich source of betalains, phenolics, and flavonoids (Source 7). They confirm the plant's significant antioxidant, anti-inflammatory, and antimicrobial activities, which are highly desirable for protective and healing lip products (Source 7)

6. **Bastos and Schliemann (2022) and Chhikara et al. (2019)** further support the therapeutic value by focusing on betalains as powerful antioxidants and discussing the array of bioactive compounds in beetroot that contribute to its functional properties in cosmetics and food science (Source 6, 10).

7. **Formulation Methods:** Studies like those **by Bobade and Dhotre (2025) and Gaikwad et al. (2023)** commonly employ the fusion method or homogeneous mixing, involving the careful heating and mixing of waxes and oils, followed by the incorporation of the beetroot extract (Source 1, 4).

AIM AND OBJECTIVES

Aim

The primary aim of this review article is to comprehensively synthesize, critically evaluate, and consolidate the current scientific literature regarding the formulation, physicochemical evaluation, and therapeutic efficacy of herbal lip balms utilizing beetroot (Beta vulgaris) extract as a natural active ingredient and colorant.

Objectives

The specific objectives that will be addressed by this review are:

Rationale and Need: To review the physiological necessity for lip care and establish the rationale for the growing consumer shift toward herbal, non-petroleum-based lip balm formulations as alternatives to conventional synthetic products.

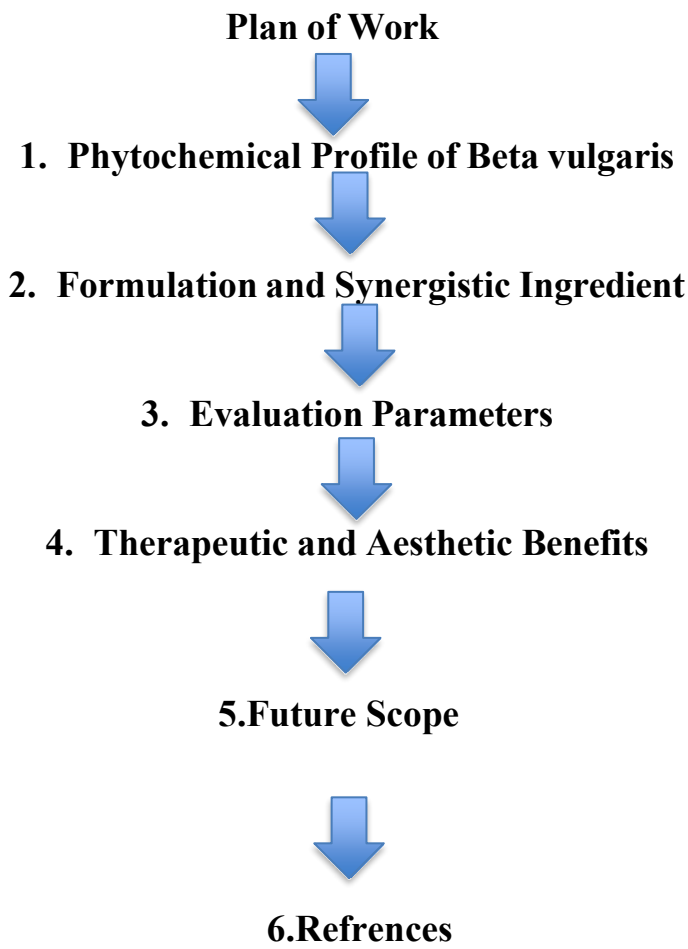
Phytochemical and Functional Profile: To detail the phytochemical composition of Beta vulgaris, specifically highlighting the functional roles of betalains as natural colorants and powerful antioxidants pertinent to lip health.

Formulation and Quality Control: To consolidate and critically analyze the literature regarding standard formulation methodologies and the essential physicochemical evaluation parameters (e.g., melting point, \text{pH}, spreadability, stability) required for quality assurance of beetroot-based lip balms.

Therapeutic Efficacy: To synthesize existing research findings on the therapeutic benefits of beetroot in lip products, particularly concerning their moisturizing, anti-oxidant, and potential lip-lightening/anti-pigmentation effects.

Research Gaps and Future Scope: To identify and articulate the current gaps in research, such as the need for standardized extraction techniques and in-vivo clinical trials, thereby suggesting future directions for advancing the field.

Plan of Work:


Plan of Work
1. Phytochemical Profile of Beta vulgaris
2. Formulation and Synergistic Ingredient
3. Evaluation Parameters
4. Therapeutic and Aesthetic Benefits
5.Future Scope
6.Refrences

Phytochemical Profile of Beta vulgaris

1. Betalains: The Primary Pigments

Betalains are water-soluble nitrogen-containing pigments responsible for the color and much of the antioxidant activity of beetroot. They are chemotaxonomic markers for the order Caryophyllales.

Betacyanins: These provide the red-violet color. The most abundant component is Betanin (75-95% of total pigment), followed by Isobetanin, Prebetanin, and Neobetanin. Betanin is a potent free-radical scavenger, effective against lipid peroxidation.

Betaxanthins: These provide yellow-orange pigments. Common compounds include Vulgaxanthin-I and Vulgaxanthin-II.

Mechanism: Betalains possess a phenolic structure that allows them to donate electrons to unstable free radicals, neutralizing oxidative stress on the lip surface.

2. Phenolic Acids and Flavonoids

Beetroot contains a significant amount of phenolic compounds which contribute to its therapeutic effects:

Phenolic Acids: Includes Ferulic acid, Caffeic acid, Syringic acid, and p-Coumaric acid. Ferulic acid is particularly noted in dermatology for its ability to stabilize Vitamin C and protect skin from UV-induced photoaging.

Flavonoids: Specific flavonoids found in beetroot include Betagarin and Betavulgarin, along with Rutin and Quercetin. These compounds exhibit strong anti-inflammatory action, helping to soothe chapped or irritated lips.

3. Vitamins and Minerals

Vitamins: It is an excellent source of Folate (Vitamin B9), which is crucial for DNA repair and cell regeneration. It also contains Vitamin C (Ascorbic acid), essential for collagen synthesis, and small amounts of Vitamin B6 (Pyridoxine).

Minerals: Rich in Potassium, Magnesium, Iron, and Manganese. Manganese is a cofactor for the antioxidant enzyme superoxide dismutase (SOD), further enhancing skin protection.

4. Carbohydrates

Beetroot is rich in sucrose, glucose, and fructose. In lip care formulations, these natural sugars act as humectants, attracting water from the air to the lips, thereby improving hydration.

MATERIALS USED:

Petroleum Jelly:

locks in moisture to help soothe and repair dry lips, leaving them looking gorgeous and noticeably healthier. It offers the long-lasting moisturization your lips require and is made with Vaseline Jelly, which is intended to protect the skin on your lips. leaves a subtle rosy scent behind and gives your lips a sheer pink colour. leaves a subtle rosy scent behind and gives your lips a sheer pink colour. Rose water hydrates your lips and gives them a lush, pink appearance. To apply it to your lips, simply dab some rose water onto a cotton pad. Next, apply a generous amount of lip balm. Your delicate pink slips appear.

Fig. no.1 Petroleum Jelly

Vitamin E:

Vitamin E functions as a natural conditioner and an antioxidant. Through the reduction of ageing indications, vitamin E helps to preserve the lips' smooth, youthful texture. A topical application of vitamin E oil can help soothe dry, chapped lips. Vitamin E accelerates the emergence of new cells on dry lips because it encourages cell turnover and regeneration. Additionally, vitamin E oil's viscous, greasy texture can stop additional inflammation. A product's colour also serves as a gauge of its quality and freshness. But compared to synthetic colours, natural hues are less harmful. Synthetic dyes are harmful to the environment and human health, but they were used commercially to create eye catching colours.

Applying lip balm guarantees that dry, chapped lips heal quickly. Your lips have thinner skin than the rest of your face. Therefore, if you have dry, chapped lips, applying a lip balm will keep your lips hydrated and hasten their healing process. Using readily accessible components, the current study attempts to make and assess herbal lip balm for lip protection. It will also make lips more beautiful and shinier. The goal of this paper was to conduct a thorough investigation on natural lip balm. The thorough literature excipients

together with formulation and evaluation served as the foundation for this.

Fig. no.2 Vitamin E Capsule

Almond Oil:

The lipids in almond oil penetrate deeply into the skin's tissues to help hydrate the lips. The calming properties of olive oil reduce the pain associated with sunburnt and cracked lips. Aloe Vera extract has anti-inflammatory properties that help fight inflammation. Lips are loaded with antioxidants that guard against wrinkles and other forms of skin damage. By penetrating deeply into the skin's tissues, the lipids in almond oil help to moisturise the lips. The pain associated with sunburnt and cracked lips is reduced by the calming properties of olive oil. The anti-inflammatory properties of aloe vera extract help to reduce inflammation. Antioxidants are instilled into the lips to help prevent wrinkles and other forms of skin

Fig. no.3 Almond Oil

Glycerol:-

As a Naturally occurring humectant, glycerine is very good at absorbing and holding onto moisture. It can

make your lips incredibly smooth and plump while sealing any fissures or dry skin. Glycerine will make your lips look incredibly soft and rosy whether they are naturally black, pigmented, or discoloured. glycerine absorbs and holds moisture well because it is a natural humectant. Your lips will become incredibly smooth and full after using it to seal any cracks or dry skin. If your lips are naturally discoloured, dark, or pigmented, glycerine will make them incredibly soft and pink.

Rose water:

Rose water, a fragrant distillation of rose petals, is a traditional elixir that is prized for its subtle aroma, many uses, and possible medical advantages. Rose water has been valued for ages in many cultures due to its fragrant qualities and its use in culinary creations, beauty rituals, and holistic treatments. This aromatic water, which is made by steam distilling rose petals, encapsulates the essence of the rose plant and gives it a variety of bioactive ingredients and a delicate yet alluring scent. Rose water has a special place in people's hearts and homes all over the world, serving as a remedy for skin irritations, elevating mood, flavouring food, and representing beauty and love.

We discover rose water's ageless allure and capacity to uplift the body and spirit as we go deeper into this fascinating realm.

Fig. no. 5 Rose Water

Beetroot:

The human lip is a very thin part of the body compared to the face skin, despite having three or four layers of skin. Lip disorders, such as inflammation and swelling, can occur quickly, so it is important to moisturise the lips with a lip balm or other lip product. Lip balms are formulations applied to the lips to prevent drying and protect against adverse environmental factors.Lip balms are products that are used to protect lips rather than to decorate them; they form an adherent, flexible, moisture resistant film of oily substance. To create lip balms, the concentration of the primary ingredients—base, oils, colouring, and flavouring agents—must be balanced. A natural method of preserving and enhancing healthy lips is to use natural lip balms.

CHEMICAL COMPOSIOTION OF BEET ROOT:

Unique nitrogen-containing pigments called battalions are only found in certain higher order fungi and families of the Caryophyllales order, where they take the place of anthocyanin colours. Betacyanin are red violet chemicals, and betaxanthins (mostly violaxanthin-I) are yellow compounds that make up the two groups of molecules found in beta vulgaris betaines. Betanin, or betanidin-5-O-beta-glucoside, is the main beta lain found in red beets. It has phenolic and cyclic amine groups that function as antioxidants. In red beetroot, betanin, the main beta lain, had a low bioavailability. Food colouring is a common usage for betaines. The number of red-violet pigments in the five Beta vulgaris cultivars from Hungary that were analysed did not differ significantly. However, it was discovered that the total beta lain content varies depending on the type when commercial beetroot products and beetroot juice made from seven red beet varieties cultivated in Upper Austria were examined. Beets have a very high antioxidant capacity when compared to other vegetables. Antioxidant capacity and red pigment contents were shown to be extremely significantly correlated, while antioxidant capacity and yellow pigment levels were shown to be significantly less correlated. It is unknown what further biological impacts beta lain may have it.

Beetroot extract:

The extract from beetroot, a colourful root vegetable with a deep crimson colour, is a strong and adaptable natural substance with a wide range of health advantages. Rich in vital minerals, antioxidants, and bioactive substances.Beetroot extract has drawn more attention for its possible therapeutic uses in both conventional and alternative medicine. Researchers and health enthusiasts alike are delving deeper into the many advantages of beetroot extract, which range from boosting exercise performance and cardiovascular health to encouraging liver cleansing and reducing inflammation. The nutrient-rich content and vivid colour of beetroot extract present a promising way to maximise health and well-being by utilising nature's powder.

FORMULATION OF BEETROOT LIP BALM:

Table No.01 Formulation

Ingredient	Quantity	Purpose
Petroleum jelly	6g	Base/emollient
Beetroot juice	2ml	Natural colorant/antioxidant
Almond oil	1ml	Moisturizer/emollient
Glycerol	0.5ml	humectant
Rose water	0.5ml	Fragrance and soothing agent
Vitamin E capsule	0.2ml (1 cap)	Antioxidant/preservative

Procedure For Preparation of Beetroot Lip Balm:

1] Preparation Of Beetroot Juice:

- Clean the beetroot, peel it, and then finely grate it.
- Squeeze the juice through a fine filter or cotton cloth.
- Make sure there is no solid residue left by filtering again. Gather 2 mL of juice.

2] Melting Petroleum Jelly:

- Fill a clean beaker with 6 g of petroleum jelly.
- In a water bath, heat it to about 60 to 70°C until it melts completely.
- Using a spatula or clean glass rod, gently stir

3] Addition Of Other Ingredients:

- Turn off the heat source.
- Place 0.5 mL of glycerol, 1 mL of almond oil, and 0.5 mL of rose water in it.
- Mix well

4] Add Beetroot Juice:

- Gradually add the 2 mL of newly made beetroot juice, stirring constantly to guarantee even mixing.

[5]Add Vitamin E:

- Squeeze in 0.2 mL of oil after puncturing one vitamin E tablet.
- Blend all components evenly by thoroughly mixing.

[6]Transfer to Moulds:

- Fill lip balm tubes or jars with the prepared balm after sterilising and cleaning them.
- Put in the refrigerator for 20 to 30 minutes or let it set at room temperature.

[7]Storage And Use:

- Store in a dry, cool location.
- Because it contains water and fresh juice, it should be consumed within two to three weeks.
- Refrigeration is advised to extend the shelf life.

Evaluation Parameters

Quality control is critical for herbal cosmetics to ensure consistency and safety. The formulated lip balm undergoes rigorous physicochemical testing:

Organoleptic Properties: The formulation is inspected visually for color homogeneity (absence of streaks), characteristic pleasant odor (masking the earthy smell of beetroot), and texture (smoothness and absence of grittiness).

Melting Point Determination: A capillary tube method is typically used. The ideal melting point should range between 60-65°C. This ensures the balm remains solid during storage (preventing leakage in pockets/purses) but softens sufficiently upon contact with the lips (body temperature ~37°C).

pH Measurement: Since lip balms are ingested in small amounts and contact mucous membranes, the pH must be neutral or slightly acidic. A 1% aqueous solution of the balm is prepared, and pH is measured using a calibrated pH meter; the acceptable range is 6.0 to 7.0.

Spread ability Test: Two glass slides are used. A standard weight (e.g., 0.5g) of balm is placed between slides, and a weight is applied. The time taken to separate the slides or the diameter of the spread circle is measured. High spreadability indicates ease of application without "dragging" the skin.

Skin irritation test:

- Apply the test sample on a skin (dorsal side of hand) for about 2cm area.
- Then observe any irritation on applied site for up to 24hr and then reported.

Stability Studies: Samples are stored at different temperatures (4°C, 25°C, 40°C) for 30 days. They are checked for "syneresis" (weeping of liquid) or phase separation.


Herbal Beetroot Lip Balm Preparation
pH Test
Melting Point Determination
Electronic Melting Point Apparatus (optimally 55–65°C)
Stability Test (Freeze-Thaw Cycling)
Temperature Cycles
4°C
25°C
40°C
Control 25C
Stress 40C
Control 25C
Stress 40C
STABILITY STAGE
Spreadability Test
Firm beetoot liper lip salm
Optimal spreadability, no drag.
Skin Irritation Test (Patch Test)
A small amount of the finalized beetroot lip balm formulation (applied inside a small patch
24 hours
No Erythema/Edema

5

Result and Discussion:

Table No.02 Evaluation Test Results

Test	Observation
Ph test	6.5
Melting point	36ºC- 40ºC
Spreadablity	Uniform spreading
Skin irritation	No irritation
stability	Pass

Product Characteristics results:

Table No.03 Product Characteristic Results

Test	Observation
Observation colour	Natural pinkish red
Fragrance	Pleasant Rose fragrance
texture	Very smooth and soft

The goal of this lip balm formulation was to preserve the balm's natural qualities by using as many natural elements as feasible. Petrolatum, synthetic waxes, alumina, parabens, hydrogenated oils, artificial scents, and colours are among the harmful ingredients that can be found in conventional lip balms. We utilised beets to add a natural hue to the balm in order to avoid problems. We assessed the lip balm's stability, pH, spread ability, and melting point. The findings revealed a pH of 6.4 and a melting point of 64°C. The balm did not distort and spread easily. Studies on the lip balm's stability over a month at various temperatures showed that it did not break down or distort at room temperature or in the refrigerator, and it retained its consistency and flawless application.

Conclusion:

In conclusion making beet root juice lip balm with as many natural elements as feasible was the goal of the current study. Almond oil served as a moisturising agent, vitamin E capsules as an antioxidant, rose water as a flavouring agent, and beetroot extract as a colouring agent. It was investigated how these additives affected the formulation's physicochemical qualities, including consistency, melt point, spread ability, and organoleptic traits. We may conclude that the use of these natural components resulted in a successful formulation for lip balm. According to the results of several studies, the formulation was safe to use and passed a number of physicochemical tests. The formulation should be stored at room temperature, according to stability data. Although beeswax was employed as a base in the current formulation, a natural base such as shea butter, paraffin wax, etc., could be used in its stead in the future When creating new products, chemists pick from thousands of chemicals, but they always take care to pick ones with chemical qualities that improve the product's appearance, texture, and functionality. For example, the majority of DIY lip balm recipes call for butter or oil of some kind because nobody wants their lip balm to be overly firm. At room temperature, oils are typically thick, viscous liquids that soften and smooth the skin because they are emollients. Butters are an additional type of emollient; at room temperature, they are soft but not liquid. Waxes, such as beeswax, which are solids at room temperature, are added to the formulation to thicken it since a very soft, liquid lip balm would be too messy. Achieving the ideal ratio of emollients to waxes is necessary to create the "perfect" product.

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