



# Betalain-Infused Nutraceutical Lipstick by *Beta Vulgaris L.*: Formulation and Assessment of a Natural Cosmetic Product

<sup>1</sup>Mr. Rushikesh E. Kumbhar, <sup>2</sup>Miss. Vaishnavi B. Hiremath, <sup>3</sup>Mr. Harshavardhan A. Musale, <sup>4</sup>Miss. Snehal E. Shetake

<sup>1,3,4</sup>Research Scholer, <sup>2</sup>Assist. Professor,

<sup>1,4</sup>Department of Pharmaceutics, <sup>2</sup>Department of Quality Assurance, <sup>3</sup>Department of Pharmaceutical Analysis

<sup>1,4</sup>Sant Gajanan Maharaj College of Pharmacy, Mahagoan, <sup>2</sup>Shivraj College of Pharmacy, Gadhinglaj, Queens University Belfast, United Kingdom

**Abstract:** Since lipstick consumers frequently consume the product, healthcare professionals must take a close look at the substances used in lipsticks, since many wellness viewers have been focusing on the product in the last few years. When consumed by individuals, the lipstick's color-enhancing chemicals can be harmful. Lipsticks come in a range of sheen and structure and are widely acknowledged as a primary beautifying tool. Its major ingredients are an oiled-wax foundation that is sufficiently rigid to create a stick, colored ink that has been melted or diffused in oil, and pigment coated in it that has been appropriately carried out sweetened, molded, and contained in a case. Lipstick highlights positive features and draws attention to flaws by giving lips a glistening, appealing color. Additionally, it keeps lips from breaking down, which can result in infections from bacteria. It has moisturizing properties for lips. Since herbal remedies are less likely to cause adverse consequences and because they use organic components instead of artificial ones, this research was conducted to produce about F1 to F6 products and assess the six formulations of natural lipstick contains Betalain extracted from *Beta Vulgaris L.* This was done because of the different adverse consequences of the artificial preparations that are currently on the market.

**Index Terms - Betalain, herbal remedies, *Beta Vulgaris L.*, Color Enhancing.**

## I. INTRODUCTION

Cosmetics are defined as any item meant to be misted, felled and massaged, dusted on, applied, or used to the body of an individual or any portion of it for the purpose of cleaning, revitalizing, enhancing looks or changing character under the D and C Act 1940 and Regulation 1945. Any items meant to be used as an element of cosmetics are also included. Chemicals called cosmetics are applied to the body in order to improve its look. By creating a visually appealing logic, nutritional makeup products can be utilized to treat skin conditions. Lipsticks are makeup products that are used to alter or highlight lip color. They are made by shaping a color dispersal into the shape of a lipstick over a sticky foundation. In the realm of cosmetic Formulations used more often than any other kind of material. They're becoming more and more widespread instead of less in usage. There isn't a known replacement for them. With lipsticks, you may easily protect your lips against the ravages of the breeze, UV rays, and chilly weather or revive the look of your makeup by adding color. Rough lips, grumbled, damaged, broken lips, wounds, ulcers on lips, blisters, and wind-burned lips are lip disorders brought on by illness or pollutants. Specifically functioning on the lips, calming, anti-irritant, skin-protective, and anti-allergic medicines are good pharmacological options for nutraceutical lipsticks. Lip glosses are meant to color the pout, but they may also be utilized for curing illnesses on the lips. due to its naturally occurring anti-irritating, comforting, and harmless qualities, beet root extract was chosen as the medicine of choice for treating blisters, injuries skin eruptive events and splits. The purpose of this

study aimed to create natural beetroot extract-based nutraceutical lipsticks having Betalain pigments that would take the place of traditional chemical lipstick colors. It has a long history of use in skin treatment and works well for a variety of skin problems.

## II. MATERIAL AND METHODS

### Extraction of Betanin from beetroot

Chroma is extracted by homogenizing pulp from fruit and solvents at a 1:1 w/v proportion. Prepare 100g of the watery-textured, sliced beetroot and macerate for at least fifteen minutes in a freezer-safe container with one hundred milliliters of solvent (EtOH and aqueous ethanol 50:50). After centrifuging the water-based mixture for twenty minutes at two thousand revolutions per minute at 4°C, screen it right away using Whatman filter sheet. Utilizing hot air, dry the extract to 3-5 milliliters under vacuum at 35°C. via the concentration procedure, totally eliminates the spirit and stores the leftovers in a dark container.

### Ingredients required for Nutraceutical Lipstick

Sr. No	Ingredients	Use	Source
1	Bees Wax	Hard base	Research Lab, Mumbai
2	Carnauba Wax	Soft wax	Research Lab, Mumbai
3	Cetyl alcohol	Base	Research Lab, Mumbai
4	Lanoline	Base	Research Lab, Mumbai
5	Beetroot extract	Coloring agent	Local market, Kolhapur
6	Castor Oil	Dyestuff solvent	Research Lab, Mumbai
7	Methyl Paraben	Preservative	Research Lab, Mumbai
8	Ethanol	Extract solvent	Research Lab, Mumbai
9	Vanilla essence	Fragrance	Kings Coffee, India

### Design of Experiment

Face-Centered Central Composite Design (FCCCD) utilized to formulate the lipstick, resulting in 9 runs, including 1 center point.

Where variables are Bees wax and Beetroot extract and responses are Breaking Point and melting point  
Formulation table of Nutraceutical Lipstick

Sr. No	Ingredients	F1	F2	F3	F4	F5	F6	F7	F8	F9
1	Bees Wax	15	15	10	15	10	10	20	20	20
2	Beetroot extract	18	6	6	12	18	12	18	6	12
3	Cetyl alcohol	5	5	5	5	5	5	5	5	5
4	Lanoline	5	5	5	5	5	5	5	5	5
5	Carnauba Wax	10	10	10	10	10	10	10	10	10
6	Castor Oil	7	7	7	7	7	7	7	7	7
7	Methyl Paraben	1	1	1	1	1	1	1	1	1
8	Vanilla essence	Q.S.								

### Method of Preparation

Melt every wax in turn, starting with the ones with the lowest melting temperatures and making sure they are all totally dispersed before going on to the second. In another vessel, combine the methyl paraben and beetroot extract coloring agent with castor oil, slowly heating the mixture. After both stages are ready, mix them together at room temperature while swirling constantly but gently to prevent overmixing. Grease the lipstick molds with glycerin, and then gently transfer the mixture into the chambers that have already been greased. To let the mixture harden, submerge the filled cylinders in a cold water bath. Using a sharp blade or razor, wipe off any extra after it has solidified. After removing the lipstick from the molds, place it in a container that is appropriate.

### III. EVALUATION TESTS FOR NEUTRACEUTICAL LIPSTICK

#### Breaking Point

The purpose of this evaluation is to evaluate the lipstick's durability and firmness. This approach involves attaching weights that apply rising pressures to the lipstick, which is positioned horizontally one inch from its foundation. The braking pressure point, also referred to as the weight at which the lipstick breaks. The test must be conducted under particular circumstances and at a temperature of around 25°C.

#### Melting Point

Unlock the glass capillary tubes on each end. Put enough lipstick inside each of the three capillary tubes, making sure the tubes are approximately ten millimeters tall. Then, let the vials stand in the capillary tube equipment for the required period of time and at the desired temperature. The degree when the material starts to the point at which something melts in a capillary tube is considered. Proceed three more times with the remaining three capillary tubes and figure out the outcome.

#### pH Measurement

Using the acid-base scale, 7 is considered "neutral," and 1-14 is a normal range of values. Although the higher values are regarded as nonacidic or alkaline, the lesser amounts are acidic. The pH of skin that is young is somewhat on the acidity side, which could confuse you. Your complexion can fight off dangerous bacteria and reactive oxygen species that might hasten premature aging if it has a higher acidity level. Utilizing a pH meter, the formulation of lipstick's pH was ascertained.

#### Skin Irritation Test

The Skin Irritation Test is a non-animal, in- vitro test that is intended to detect substances and combinations that have the ability to cause a medium skin reactions along with distinguish between UN GHS Category 2 Skin Irritants and UN GHS 3 Mild Skin Allergens, as well as substances that do not need to be classified. Rubbing the medication on your body for ten minutes is how it's done.

#### Perfume Stability

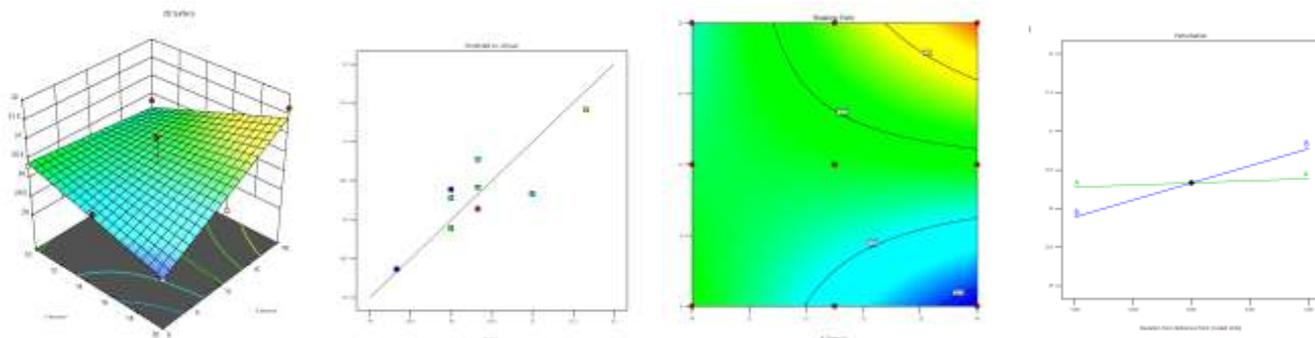
The durability of scent may also be evaluated by periodically comparing the scent with freshly applied lipstick and by keeping lipstick in a heated oven at 40°C. One of the regular jobs a fragrance or application engineer does in his career is conducting stability evaluations on fragrance base substances such as bases, specialization, the best aromatic oils, and referred to as aromatic compounds. Fragrance is not the only factor that determines whether a perfume composition is accepted. Important factors also include color stability, excellent solubility, and the highest level of smell stability achievable in the final product.

### IV. RESULT AND DISCUSSION

#### 1. Breaking Point

Sr. No.	Batch Code	Breaking Point (°C)			Average
		1	2	3	
1	BL 1	30	31	30	30.33
2	BL 2	31	29	30	30
3	BL 3	29	31	31	30.33
4	BL 4	31	30	32	31
5	BL 5	30	31	30	30.33
6	BL 6	31	30	29	30
7	BL 7	33	31	31	31.66
8	BL 8	30	30	28	29.33
9	BL 9	28	31	31	30

In table displayed breaking point of all the nine batches formulated and all the reading of breaking point are within a range



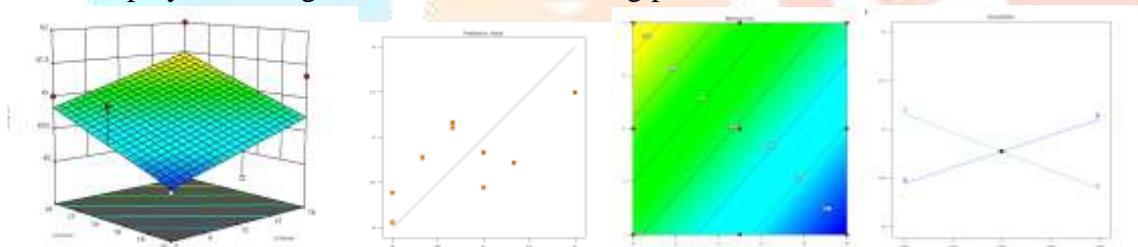
### Final Equation in Terms of Actual Factors

Breaking Point = +32.77444 -0.222000 Beeswax -0.217361 Beetroot +0.019417 Beeswax x Beetroot

## 2. Melting Point

Sr. No.	Batch Code	Melting Point (°C)			Average
		1	2	3	
1	BL 1	60	61	61	60.66
2	BL 2	61	62	60	61
3	BL 3	60	62	61	61
4	BL 4	61	61	59	60.33
5	BL 5	62	61	63	62
6	BL 6	61	60	61	60.66
7	BL 7	63	59	62	61.33
8	BL 8	62	59	59	60
9	BL 9	60	61	59	60

Table displayed readings of all 9 batches Melting point



### Final Equation in Terms of Actual Factors

Melting Point = +61.2772 -0.07766 Beeswax + 0.05527 Beetroot

On the basis of Melting point optimized batch of this nutraceutical lipstick formulation is BL 5

## 3. pH Measurement

Batch BL 5's pH reading for the nutraceutical lipstick indicated that 6.58 was the ideal pH. This pH reading is in the ballpark of what lip products should ideally be between 5.5 and 7.0. The lipstick's pH of 6.58 guarantees that it is neither too acidic nor alkaline, which is essential for preserving the comfort and health of the lips. Lip cosmetics in this pH range can be used on a daily basis since they are less prone to irritate, dry out, or create pain.

## 4. Skin Irritation test

The nutraceutical lipstick underwent a skin irritation test, where it was applied to the skin multiple times across all batches. The results showed no signs of irritation or adverse reactions, indicating that the lipstick passed the skin irritation test. This suggests that the formulation is gentle and non-irritating, making it suitable for use on sensitive skin. The absence of any irritation or reaction demonstrates the safety and tolerability of the nutraceutical lipstick, providing confidence in its use for cosmetic purposes. Further testing may be necessary to confirm its efficacy and long-term safety.

## 5. Perfume Stability

The nutraceutical lipstick underwent a perfume stability test, where batches were stored for 5, 10, and 15 days to assess the stability of the fragrance. The results showed that the perfume remained stable and unchanged across all batches and storage periods, indicating that the nutraceutical lipstick passed the perfume stability

test. This suggests that the fragrance formulation is robust and resistant to degradation, ensuring a consistent and pleasant scent over time. The successful outcome of this test demonstrates the product's ability to maintain its sensory attributes, contributing to its overall quality and consumer acceptability.

## V. ACKNOWLEDGMENT

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