

# Optimization of the Mixing of Hibiscus Flower (*Hibiscus rose sinensis*) Extract as a Lip Balm Color with Variations in Concentration

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## Abstract

*Hibiscus rosa sinensis* L. is widely used by the community to decorate the garden because of its splendor. In addition, Hibiscus flowers containing anthocyanin and flavonoids have antioxidants, which function as antioxidants against free radicals. This natural dye can be obtained by extracting Hibiscus flowers through maceration using 96% ethanol. In this research, Hibiscus flowers were obtained from Sendang Rejo Village, Lamongan Regency. In the extract process, the Hibiscus flower's petals were blended until smooth, then added to 96% ethanol (1 liter) and stirred for 30 minutes. Filtrate results were taken, placed in a porcelain dish, and put in an oven at 60 °C for a day. Four formulas were made with varying levels of Hibiscus flower extract: F1 (0%), F2 (2%), F3 (4%), and F4 (6%). Physical evaluation included organoleptic, homogeneity, dispersibility, pH, and qualitative tests for the identification of anthocyanins. The results of the organoleptic, homogeneity, dispersion, pH, and identification of anthocyanins evaluations were then analyzed descriptively. The data from the organoleptic test indicated that F1 had an odorless white color, while F2, F3, and F4 had a red and white color with a distinctive Hibiscus flower aroma. The homogeneity test revealed that while F1 had good homogeneity, F2, F3, and F4 were not homogeneous (heterogeneous). The spreadability test on the four formulas did not fall within the range of requirements, namely 5-7 cm, with an average value of 3.53, but this was related to several significant reasons. In addition, the pH test results matched the requirements for topical preparations, namely 4.5–6.5, with an average value of 5.075. In conclusion, Hibiscus flower extract obtained through the maceration method with 96% ethanol could not give a homogeneous red color from the anthocyanin substance. Physical evaluation and anthocyanin identification tests also obtained good results.

**Keywords:** Anthocyanin; Hibiscus flowers; lip balm; physical evaluation

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## INTRODUCTION

In the 5.0 era, cosmetics are a mandatory thing for toddlers and the elderly, both men and women. Cosmetics are rapidly competing with the drug and herbal medicine industries. Cosmetics are divided into two categories: (1) decorative cosmetics such as lipstick, eyeshadow, blush, eyebrow pencil, and hair dye; and (2) skin care cosmetics including day cream, night cream, bath soap, shampoo, deodorant, and lip balm.<sup>1</sup>

Lip balm is a semi-solid preparation included in the cerata class with a fat base. It is used to moisturize lips and prevent chapped lips due to exposure to sunlight, dust, and pollution, which cause damage to the lip skin layer. Lip balm is also used to regenerate dry and rough skin cells. Lip

balm is occlusive, which can retain lip moisture. In addition, if the lips look rough, cracked, black, and uneven in color, it can lead to a decrease in self-confidence.<sup>2</sup> Therefore, lip care must be carried out intensely, both using lip scrubs and lip balms, to beautify and increase self-confidence. The formula used in the manufacture of lip balm must be standardized in the Indonesian Cosmetics Codex for both active ingredients and excipients. Basically, the character of lip balm is similar to that of lipstick because it has a fat or wax base used as a moisturizer.<sup>3,4</sup> However, lip balm has emollient properties and is colorless when applied to the lips. Cosmetic active ingredients are divided into two categories: herbal and synthetic.

**Table 1.** The Formulation of Lip Balm with Concentration Variation of Hibiscus Flower Extracts

Ingredients	Functions	Formula (%)			
		1	2	3	4
Hibiscus Flowers Extract	Active ingredient (anthocyanin)	0	2	4	6
Propylene Glycol	Cosolvent	10	10	10	10
Methyl hydroxy benzoate	Preservative	8	8	8	8
Butyl hydroxy toluene	Antioxidant	0.1	0.1	0.1	0.1
Lanolin	Emolien	10	10	10	10
Vaselin alba	Fat base	15	15	15	15
Cera alba	Fat base	15	15	15	15
<i>Rose oil</i>	Fat base	0.05	0.05	0.05	0.05
<i>Virgin coconut oil</i>	Fat base	to 20	to 20	to 20	to 20

Further, the development of the cosmetic industry currently refers to herbal preparations with a high selling value and halal status.<sup>3</sup>

One of the plants that can be used as an active substance in lip balm preparations is Hibiscus flowers. Hibiscus flowers with the Latin name *Hibiscus Rosa Sinensis* L. have a beautiful ornament with a red color

when blooming. It grows widely around the world, including in Southeast Asia and India. This plant contains flavonoid anthocyanins, which are widely used in food coloring and cosmetics.<sup>5</sup> Therefore, this study was conducted to obtain concrete parameters using safe, natural ingredients for mixing fat-based lip balm preparations with Hibiscus flower extract.

## METHOD

### Tools and Materials

The tools utilized were analytical balance (Shimadzu ATX224), water bath, porcelain cup, beaker glass, lip balm pot, oven (UN55 Memmert), and watch glass. The ingredients were Hibiscus flowers, 96% ethanol (Methan Tirta), Cera alba (Sumber Ilmiah Persada), Vaseline album (Sumber Ilmiah Persada), lanolin (Sumber Ilmiah Persada), propylene glycol, nipagin, Butylene Hydroxy Toluene (BHT) (Sumber Ilmiah Persada), Rose oil (Sumber Ilmiah Persada), and Virgin Coconut Oil (VCO) (Sumber Ilmiah Persada).

### Sample Preparation

For sample preparation and maceration of Hibiscus flowers, the petals were peeled off and then placed on a tray, covered with a black cloth, and aired to dry. The flowers were blended until smooth and sieved to remove the finer parts. Then, the flowers were put into a 1-liter jar. Ethanol of 96% was added, then stirred for 30 minutes and tightly closed at room temperature. Then, the flowers were stirred for ten minutes and filtered. The filtrate was then taken. Next, the porcelain dish was placed in the oven at 60 °C for three days.

### *The Formulation of Hibiscus Flower Extract Lip Balm*

The preparation of lip balm using Hibiscus flower extract was made with four formulas: F<sub>1</sub> (0%), F<sub>2</sub> (2%), F<sub>3</sub> (4%), and F<sub>4</sub> (6%). BHT was dissolved into VCO in a glass beaker, then added to the mixture of cera alba, lanolin, and Vaseline album, which was melted in a water bath and stirred homogeneously (C<sub>1</sub>). Then, the aqueous phase of nipagin and propylene glycol homogeneously (C<sub>2</sub>) were mixed. C<sub>2</sub> was mixed with C<sub>1</sub> homogeneously, and then Hibiscus flower extract was added and mixed until smooth. The

preparation was placed in a pot and evaluated.

### Evaluation of Hibiscus Flower Extract Lip Balm

#### Organoleptic test

The preparation of Hibiscus flower extract lip balm was evaluated visually with parameters of texture, color, and aroma.<sup>6,7</sup>

#### Homogeneity test

A total of 0.5 grams of the preparation was placed on a glass object and then covered using a deck glass and observed under a microscope with a magnification of 40x.<sup>6,7</sup>

#### Spreadability test

A total of 0.5 grams of the preparation was placed on a ballast glass, then covered with glass, and the diameter of the distribution area was measured. After 1 (one), add the ballast, let stand for one minute, and measure the diameter of the distribution area until the preparation was constant and did not expand anymore.<sup>6,7</sup>

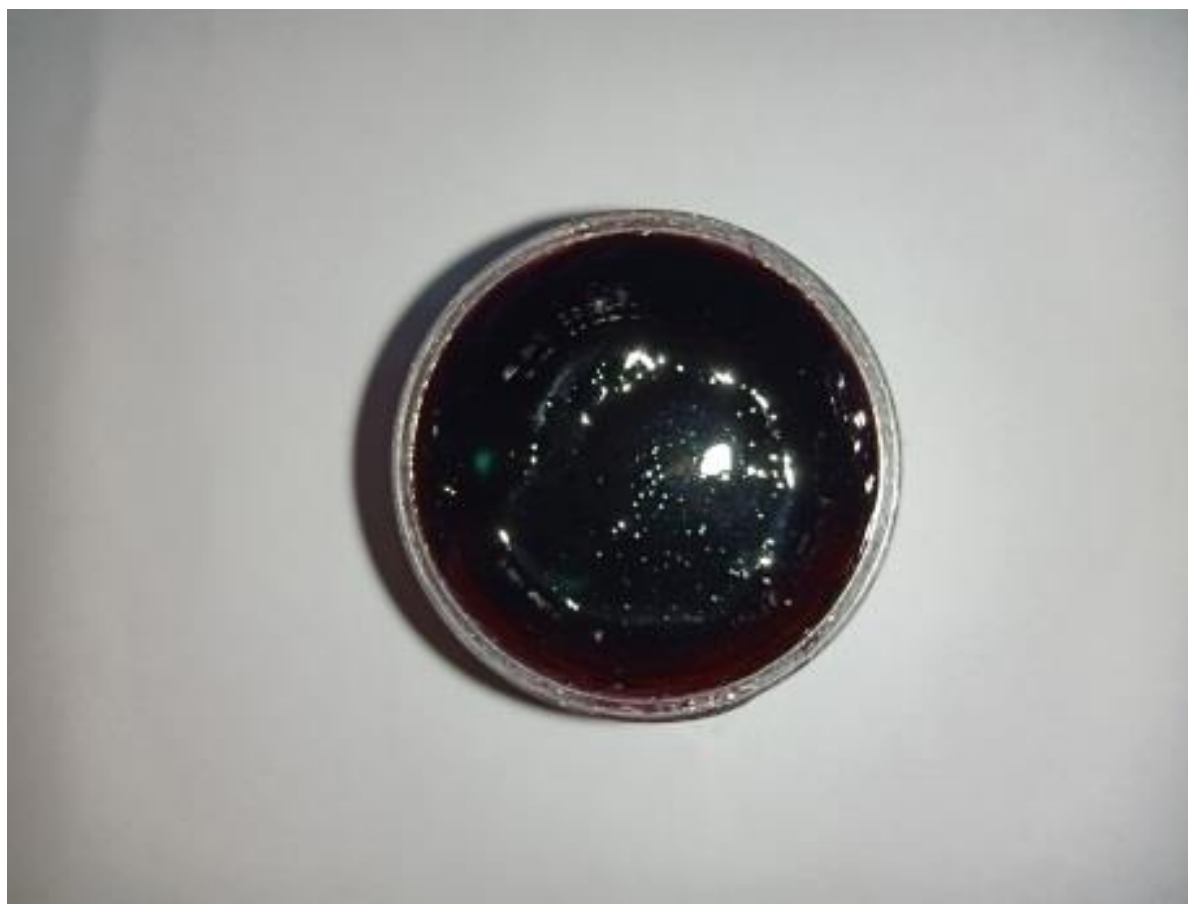
#### pH test

A total of 1 gram of the preparation was put in a glass beaker, and 10 ml of CO<sub>2</sub>-free aqua was added. Then, a pH meter was inserted into the preparation, and the researchers waited for the value to appear and stabilize.<sup>6</sup>

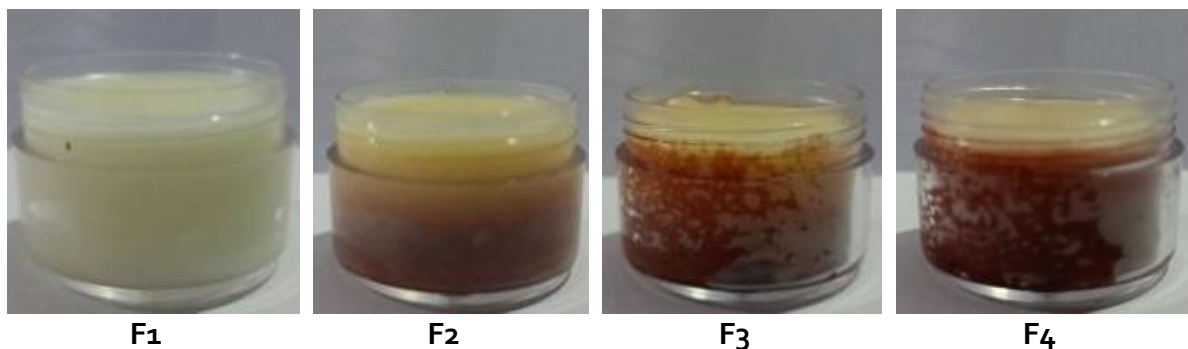
## RESULTS AND DISCUSSION

This study used Hibiscus flower extract, which was formulated into four: F<sub>1</sub> (0%), F<sub>2</sub> (2%), F<sub>3</sub> (4%), and F<sub>4</sub> (6%).

While the results of the Hibiscus flower extract can be seen in Figure 1, the formula results can be seen in Figure 2. In addition, the organoleptic evaluation can be observed in Table 2, while the homogeneity, spreadability, and pH evaluation can be perceived in Table 3.



**Figure 1.** Hibiscus Flower Extracts



**Figure 2.** The Preparation of Hibiscus Flower Extract Lip Balm Information

- F1: 0%
- F2: 2%
- F3: 4%
- F4: 6%

Hibiscus flower extract has chemical components of flavonoids, citric acid, tartaric acid, cyclopropanoid, flavonoid glycosides, Hibiscetine, malic acid, and anthocyanin pigments with pelargonidin types.<sup>8-10</sup> To date, more than 540 types of

anthocyanins can give blue, red, and purple colors.<sup>11</sup> During the maceration process, temperature and storage can damage anthocyanin pigments, although their degradation is not affected by oxygen but is strongly influenced by

temperature accumulation.<sup>5</sup> The opening of the ring and the degradation of anthocyanins are factors causing color changes.<sup>10</sup>

In this study, the organoleptic results uncovered that F<sub>1</sub> was white, while F<sub>2</sub>, F<sub>3</sub>, and F<sub>4</sub> were red mixed with white. Apart from their bright and attractive colors, their solubility was also quite high in

water.<sup>12,13</sup> The texture of F<sub>1</sub> looked drier than that of F<sub>2</sub>, F<sub>3</sub>, and F<sub>4</sub> because F<sub>1</sub> did not have an antioxidant that functioned as a moisturizer. In addition, there was no aroma caused by F<sub>1</sub> because there was no active ingredient in Hibiscus flower extract, while F<sub>2</sub>, F<sub>3</sub>, and F<sub>4</sub> had a distinctively strong Hibiscus flower aroma. The aroma comes from the refreshing acid compound in Hibiscus flowers.<sup>14,15</sup>

**Table 2.** Results of Organoleptic, Physical Evaluation

Lip balm formula	Form	Color	Odor
<b>F<sub>1</sub> (0%)</b>	Cerata	White	No odor
<b>F<sub>2</sub> (2%)</b>	Cerata	Red mixed white	The poor smell of Hibiscus Flowers
<b>F<sub>3</sub> (4%)</b>	Cerata	Red mixed white	The moderate smell of Hibiscus Flowers
<b>F<sub>4</sub> (6%)</b>	Cerata	Red mixed white	The strong smell of Hibiscus Flowers

Additionally, the homogeneity evaluation results revealed that the preparation of F<sub>1</sub> had a homogeneous composition. This is because Cera alba can be used to increase the melting point value and is a good binder in this formula. These four samples, F<sub>2</sub>, F<sub>3</sub>, and F<sub>4</sub>, were made up of different amounts of red anthocyanins from Hibiscus flower extract and white fat base

from Cera alba<sup>15</sup>. This is due to the fact that the withdrawal of Hibiscus flower extract using ethanol as a polar solvent cannot be mixed with the Cera alba base, i.e., fat (non-polar). It results in the inability to mix the extract and the fat base of the formula. Besides, F<sub>1</sub> was well mixed because there was no mixing between polar and non-polar compounds.

**Table 3.** The Results of the Physical Evaluation of Homogeneity, Spreadability, and pH

Parameters	F <sub>1</sub> (0%)	F <sub>2</sub> (2%)	F <sub>3</sub> (4%)	F <sub>4</sub> (6%)
Homogeneity	Homogeneous	No Homogeneous	No Homogeneous	No Homogeneous
Spreadability	2.75 cm	3.4 cm	3.85 cm	4.15 cm
pH	4.6	5.1	5.3	5.3

The evaluation of dispersion determines how widely the preparation of Hibiscus flower extract lip balm can spread when applied. Good dispersion for topical preparations is 5-7 cm, as much as 1 gram.<sup>15,16</sup> The results of the average dispersion test of 3.53 cm could be concluded that it did not meet the standard requirements because the preparation was weighed at only 0.5 grams instead of 1 gram. Hence, the number of preparations used affected the spreadability of the preparation. In

addition, the semi-solid texture, such as cerata in the formula, impacted the spreadability to be narrower due to the absence of the aqueous phase.<sup>17-19</sup>

Moreover, the evaluation and pH determination of Hibiscus flower extract lip balm applied to the lips is expected to be in the range of 4.5–6.5 because it is the pH of a topical preparation.<sup>20-22</sup> Topical preparations with a too-acid pH will cause sensitive and red skin, while if they are too alkaline, they will cause eczema and

cracked skin. Hence, it is necessary to have a specific pH to prevent skin damage due to inappropriate pH values. In this regard, the chemical structure and pH of anthocyanins in Hibiscus flower extract have different pH values depending on the conditions. Neutral pH (pH 7) does not give color. Acidic pH (pH < 3) is red, while alkaline pH (pH > 10) is blue.<sup>23-25</sup>

The results obtained are acceptable in accordance with the requirements of the Indonesian Cosmetics Codex. Nevertheless, for uneven color results, a mixing process with better heating needs to be carried out.

## CONCLUSION

It can be concluded that the Hibiscus flower extract using a 96% ethanol solvent through the maceration method could not be used as a lip balm formulation based on Cera alba fat. The characteristic evaluation results demonstrated that the organoleptic test and homogeneity test did not meet the standard requirements set by the Indonesian cosmetic codex.

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