


Formulation And Physical Properties Testing Of Lip Tint Preparations Of Akalifa Leaf Extract (Acalypha Wilkeisiana Mueill. Arg)

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Article Info	ABSTRACT
<p>Keywords: Acalypha wilkeisiana Mueill. Arg, Physical Properties Test, Lip tint, Natural Dyes.</p>	<p>Cosmetics are preparations of several ingredients for external use such as skin epidermis, hair, nails, lips, teeth and oral cavity. Lip tint is a lip coloring product that helps lips become more colorful and fresher. One of the plants that can be used as a natural dye is akalifa leaves (Acalypha wilkeisiana Mueill. Arg.). Based on research, akalifa leaves contain chemicals, namely, saponins, flavonoids, tannins, polyphenols, alkaloids. To make formulations and test the physical properties of lip tint preparations with concentrations of 10%, 13%, 16%. This research method uses a laboratory experimental design. The sample used in this research was akalifa leaf extract which was obtained by the maceration extraction method using 96% ethanol solvent. Physical property tests carried out include organoleptic tests, homogeneity tests, pH tests, irritation tests, spreadability tests, hedonic tests. The data will then be analyzed with one way ANOVA tests and LSD tests. The formulation results from concentrations of 10%, 13%, 16% which were liked by many panelists were F3. Evaluation of the physical properties of organoleptic tests on 4 lip tint preparations of akalifa leaf extract and one of them without extract (blank) has a clear color (F0), pink color (F1), red color (F2), deep dark red color (F3). The results of the irritation test at F0 – F3 showed that there was no irritation among the panelists. The parameters for protecting against irritation reactions were reviewed based on the presence of mild erythema, clear erythema, and strong erythema. The lip tint formulation with a concentration of akalifa leaf extract 16% (F3) was most preferred by the panelists. The physical properties observed include organoleptic tests, homogeneity tests, pH tests, irritation tests, spreadability tests, and liking tests, all of which show good results and are safe to use.</p>
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INTRODUCTION

Cosmetics are preparations of several ingredients for external use such as skin epidermis, hair, nails, lips, teeth and oral cavity. Apart from that, cosmetics also have a cleansing effect, increase attractiveness and protect the skin (Oktaviani & Krisnawati, 2019). Most women believe that using cosmetics can make them more beautiful. One cosmetic that is popular with

women is lip color. Lip color is a cosmetic preparation that is used to color the lips with an artistic touch so as to increase the aesthetics of facial make-up (Risnawati & Purba, 2012).

There are several types of cosmetic products used for lip makeup, including lip cream, lip tint, lipstick. One of the many types of cosmetics Favored by women is lip tint. Lip tint is a lip coloring product that helps lips become more colorful and fresher, and tends to moisturize, making lips look more natural. Lip tint preparations have a gel or liquid texture, so many people choose to use them because they feel lighter on the lips than other lip cosmetic products (Meliana & Pribadi, 2022).

Behind the beauty of lip tint colors, many lip tint and lipstick formulations on the market use synthetic dyes. In 2016, BPOM data found that 43 cosmetics in Indonesia contained synthetic and dangerous ingredients. Identified hazardous substances include rhodamine B, red K3, and red K10 dyes. These dyes can irritate the respiratory tract and are carcinogenic (can cause cancer), and in high concentrations they can also cause liver damage. Currently, the use of these dangerous ingredients in making cosmetics is prohibited based on BPOM RI principles. Number 18 of 2015 concerning Technical Requirements for Cosmetic Ingredients (BPOM, 2016).

Therefore, the aim of this research is to try to find alternative coloring ingredients by determining the formulation in lip tint preparations. Natural dyes that have the potential to be developed can come from extracts of fruit, tubers, vegetables, and so on which contain color. One thing that can be used as a natural dye is akalifa leaves (*Acalypha wilkeisiana* Müeill. Arg.) (Sari, 2023).

Akalifa leaves (*Acalypha wilkeisiana* Müeill. Arg.) is an ornamental plant that belongs to the group of woody shrubs. The contents of akalifa leaves (*Acalypha wilkeisiana* Müeill. Arg.) include alkaloids, flavonoids, phenols, steroids and saponins which are antioxidants and can function to neutralize free radicals that attack cells in the body. Akalifa leaf extract (*Acalypha wilkeisiana* Müeill. Arg.) can be used as a natural coloring in cosmetic preparations because it contains anthocyanin compounds.

Based on the background description, this research will carry out the formulation and physical properties of lip tint preparations from akalifa leaves (*Acalypha wilkeisiana* Müeill. Arg.) as a natural coloring agent. The dye from akalifa leaves is extracted using the maceration method using 96% ethanol. The lip tint formulation consists of propylene glycol, isopropyl myristate, glycerin, glyceryl monostearate, methylparaben, propylparaben, sorbitol, tween 80, PEG-9-Dimethicone, fragrance and the addition of akalifa leaf extract with concentrations of 10%, 13%, 16%, then The lip tint preparation that will be produced is tested for physical properties which include organoleptic test, pH test, homogeneity test, irritation test, liking test, spreadability test.

METHODS

Tools and materials

The tools used in this research were Erlenmeyer (Pyrex), stirring rod, beaker (Duran), measuring flask (Pyrex), pipette, mortar, stemmer, funnel, blender, gauze, steam cup, watch glass, spatula, scales (Ohaus), and pH meter.

The ingredients used in this research were akalifa leaf extract (*Acalypha Wilkeisiana* Müeill. Arg), ethanol 96%, propylene glycol, isopropyl myristate, tween 80, methyl paraben, propyl paraben, peg-9-dimethicone, glycerin, glyceryl monostearate, and sorbitol.

Work procedures

Preparation of simplicia and akalifa leaf powder (*Acalypha Wilkeisiana* Müeill. Arg)

Collecting akalifa leaves (*Acalypha Wilkeisiana* Müeill. Arg) from Klakah Village, Lumajang Regency. Then, determination of akalifa leaf plants (*Acalypha wilkeisiana* Müeill. Arg.) was carried out at Ahmad Dahlan University, Yogyakarta Number 011/Lab.Bio/B/I/2024. The purpose of the determination is to ensure that the plant is truly a species (*Acalypha wilkeisiana* Müeill. Arg.). Next, the akalifa leaves (*Acalypha Wilkeisiana* Müeill. Arg) were washed with running water and dried in an oven at 50°C. The dried akalifa leaves are crushed by blending without damaging or losing the required chemical content. After that, sift it with a 60 mesh sieve to get a fine powder.

Extraction method

Preparation of akalifa leaf extract (*Acalypha Wilkeisiana* Müeill. Arg) was made using the maceration extraction method using 96% ethanol solvent. The material used was 500 grams of akalifa leaf simplicia powder (*Acalypha Wilkeisiana* Müeill. Arg) with 1500 mL of 96% ethanol solvent. Soak for 1x24 hours and avoid light, while stirring occasionally. Then filtered using filter paper. The residue collected from the resulting maserate was collected and remaceration was carried out with 500 ml of solvent 2 times. The resulting combined maserate is collected and then evaporated using a water bath at a temperature of 50°C to obtain a thick extract of akalifa leaves (*Acalypha Wilkeisiana* Müeill. Arg).

Lip tint formulation

No	Material	Formula	Formula	Formula	Formula	Utility
		0 %	1 %	2 %	3 %	
1	Akalifa leaves	-	10,00	13,00	16,00	Natural dye
2	Propylene glycol	3,00	3,00	3,00	3,00	Solvent/humectant
3	Isopropyl myristate	10,00	10,00	10,00	10,00	Emollient
4	Glycerin	6,70	6,70	6,70	6,70	Humectants/ Sweetener
5	Glyceryl monostearate	1,00	1,00	1,00	1,00	Emollient
6	Methylparaben	0,18	0,18	0,18	0,18	Preservative
7	Propylparaben	0,02	0,02	0,02	0,02	Preservative
8	Tween 80	5,00	5,00	5,00	5,00	Emulsifier
9	PEG-9-Dimethicone	4,00	4,00	4,00	4,00	Thickener
10	Fragrance	1,00	1,00	1,00	1,00	Fragrance
11	Sorbitol	Ad 20	Ad 20	Ad 20	Ad 20	Solvent

Making lip tint preparations

Dissolve methyl paraben and propyl paraben with propylene glycol and grind until homogeneous. Add isopropyl myristate and tween 80 and stir, then add PEG-9-dimethicone,

and glyceryl monostearate stir, then add glycerin and sorbitol and stir until homogeneous. The next step is to add akalifa leaf extract (*Acalypha Wilkeisiana* Mueill. Arg) with three concentrations (10%, 13% and 16%) and stir until homogeneous, finally add enough fragrance and stir. Then put the lip tint preparation into the container.

Evaluate lip tint preparations

a. Organoleptic Test

This organoleptic test is carried out with the aim of determining the physical appearance of the preparation which includes color, aroma, and shape or texture of the lip tint preparation (Sutaryono et al., 2018).

b. Homogeneity Test

The homogeneity test was carried out using a glass object. A certain amount of the preparation is applied to a piece of glass or other suitable transparent material, the preparation must show a homogeneous composition and no visible coarse grains (Nurmi, 2019).

c. Test pH

The pH test aims to determine whether the lip tint preparation is in accordance with the physiological pH of the lip skin. A good lip color has an acidity value close to the physiological pH value of the lip skin, namely 4.5 – 7 (Harefa, 2019).

Irritation Test

The research was approved by the ethics community of Dr. Soebandi University, Jember with the number 283/KEPK/UDS/IV/2024. The irritation test of the preparation was carried out using the open patch test method (Patch Test) on the lower arm of 30 panelists. Prepare a lip tint preparation of akalifa leaf extract then apply F0, F1 on the lower right arm and F3, F4 on the lower left arm in the amount of 0.2 ml with a distance of 1 cm on each formula, leave it open then observe for 15 minutes and 30 minutes to 1, 2, 3 and 4 hours. Observation parameters: (-) no reaction, (+) weak positive reaction characterized by mild erythema or dryness at the application site, (++) moderately positive reaction characterized by clear erythema and possibly spreading outside the application site, (+++) a very positive reaction is characterized by intense and often diffuse erythema accompanied by edema (Risnawati & Purba, 2012).

Spreadability Test

The smearability test is carried out visually, namely by applying the lip tint preparation to the back of the hand. The spreadability test parameters are viewed from how little or how much color can stick to the skin (Afni et al., 2021).

Likeability Test (hedonic test)

The preference test was carried out to see how many panelists liked the lip tint preparation. This test was carried out visually on 30 panelists. Then each panelist rated the texture, color and aroma of the lip tint according to the preference scale contained in the questionnaire (10). The panelists wrote: Dislike (TS): 1, Dislike (KS): 2, Quite Like (CS): 3, Like (S): 4, Very Like (SS): 5

Data collection technique

a. Questionnaire

A questionnaire is a data collection technique that is carried out by giving a set of questions or written statements to respondents to answer. Data collection techniques using questionnaires in this research are needed for irritation tests and liking tests which will be given to 30 panelists.

b. Data analysis technique

Analysis of data from testing the physical properties of lip tint preparations from akalifa leaf extract (*Acalypha Wilkeisiana* Müeill. Arg), including organoleptic tests, homogeneity tests, spreadability tests are descriptive data, while pH tests, irritation tests and liking tests are quantitative data. The data will then be analyzed to test normality with Shapiro-Wilk ($p\text{-value} > 0.05$) and homogeneity test with Homogeneity of variance with a significant value ($p\text{-value} > 0.05$). If the data is normal and homogeneous, then proceed with the One Way ANOVA test to obtain a significant value, namely ($p\text{-value} < 0.05$), which means the samples used produce significant differences, then it can be continued with the LSD (Least Significant Difference) test. If the data is not normally distributed and is not homogeneous, then continue using the Kruskal Wallis method to obtain a significance value, namely ($p\text{-value} < 0.05$), which means the sample used produces significant differences.

RESULTS AND DISCUSSION

Data on the results of obtaining akalifa leaf extract after the maceration extraction process can be seen in the table.

Table 1 Yield Results of Akalifa Leaf Extract

Heavy simplicia	Heavy Extract	% Rendement
500 grams	77,7 grams	15,54%

The extract yield calculation was carried out to determine the ratio of the amount of extract obtained. The weight of the simplicia is 500 grams and the weight of the extract after maceration is 77.7 grams. According to the Indonesian Ministry of Health in 2013, the yield calculation was determined based on the weight percentage (b/b) between the yield and the weight of the simplicia powder used in weighing. The higher the percent yield value produced indicates the greater the value of the extract produced. Determination of yield levels aims to determine the levels of secondary metabolites carried by the solvent but cannot determine the type of compound carried (Tutik et al, 2021).

The yield of 15.54% shows that the solvent in the maceration process is able to carry many secondary metabolites from akalifa leaf simplicia (*Acalypha Wilkeisiana* Müeill. Arg). However, determining the yield level does not identify the type of compound carried. Overall, the results of this research support the development of akalifa leaf extract formulations (*Acalypha Wilkeisiana* Müeill. Arg) and show that the maceration method is effective in producing extracts with high yields.

Test Results of Physical Properties of Akalifa Leaf Extract Lip Tint Preparations

The results of the lip tint preparation evaluation test were carried out on each formula:

Table 2 Physical Properties Test Evaluation Results

Testing	Standar	Formula			
		F0	F1	F2	F3
Organoleptic Test					
Form	Liquid	Liquid	Liquid	Liquid	Liquid
Color	Red	Clear	Pink	Red	Deep dark red
Aroma	Strawberries	Strawberries	Strawberries	Strawberries	Strawberries
Homogeneity Test	+Homogeneous -Inhomogeneous	+	+	+	+
Test pH	4,5-7	4,63	4,63	4,63	4,63
Irritation Test	(-) no reaction (+)mild erythema (++)clear erythema (+++)+strong erythema	-	-	-	-
Spreadability Test	1-5 rub	5 rub	5 rub	5 rub	5 rub
Test Likeability					
Form	The highest value is preferred by the panelists	3,57	3,87	4,43	4,73
Color	The highest value is preferred by the panelists	1,83	3,63	4,40	4,67
Aroma	The highest value is preferred by the panelists	4,17	4,47	4,50	4,80

In this research, akalifa leaf extract (*Acalypha Wilkeisiana* Müeill. Arg) was made using the maceration method by weighing 500 grams of akalifa leaf powder and then dissolving it with 1500 mL of 96% ethanol solvent. Soak for 1 x 24 hours and avoid sunlight, while stirring occasionally. Then filtered using filter paper. The residue collected from the resulting macerate was collected and remaceration was carried out with 500 ml of solvent 2 times. After that, the combined maserate results were collected and then evaporated using a water bath at a

temperature of 50°C to obtain a thick extract of akalifa leaves (*Acalypha Wilkeisiana* Müeill. Arg).

The next step is making a lip tint formulation from akalifa leaf extract (*Acalypha Wilkeisiana* Müeill. Arg) by dissolving methyl paraben, propyl paraben with propylene glycol then grinding until homogeneous. Add isopropyl myristate, stir tween 80, then add PEG-9-dimethicone, glyceryl monostearate stir, then add glycerin, sorbitol stir until homogeneous, then add akalifa leaf extract (*Acalypha Wilkeisiana* Müeill. Arg) with three concentrations (10%, 13 %, and 16%) stir until homogeneous, finally add enough fragrance, stir until homogeneous then put into a container, then test the physical properties of the lip tint preparation which includes:

Organoleptic testing or also commonly referred to as sensory testing or sensory testing is a test using the human senses as a tool to measure the acceptability of a product. Organoleptic testing has an important role in determining the physical quality of a preparation. Organoleptic testing can show indications of preference, quality deterioration and other defects in the product. The organoleptic test will be carried out visually, namely by looking directly at the color, aroma and shape of the lip tint preparation being made (Nurrahman et al.,2021).

Based on the results of organoleptic tests on 4 lip tint preparations with akalifa leaf extract and one without extract (blank), it was found that the preparation had a clear color in F0, a pink color in F1, a red color in F2 and a deep dark red color in F3. Meanwhile, the aroma of the lip tint preparations all smell like strawberries because they are added with strawberry fragrance. The shape of all lip tint preparations that have been made show liquid form, the results obtained are in accordance with the results of research by Yunita (2022) regarding the formulation and testing of the physical properties of lip tint preparations using beetroot extract (*Beta Vulgaris* L.,) as a natural colorant.

Overall, this research shows the great potential for using akalifa leaf extract in cosmetic products, especially lip tint. This extract not only provides the desired color variations but also ensures safety and comfort of use. A lip tint preparation can be said to be good if it is in liquid form and is red in color. Furthermore, the homogeneity test is an important factor that determines the quality of the lip tint preparation because the active substance used is an extract which must be evenly distributed in the lip tint preparation in order to provide maximum effect, observed by smearing the preparation on a piece of transparent glass (Madziga et al.,2021).

Based on the results of the homogeneity test on lip tint preparations from akalifa leaf extract, it showed that all preparations did not show any coarse grains when the preparation was applied to a glass object. This shows that the preparation made has a homogeneous composition, the results obtained are in accordance with the results of research by Yunita (2022) regarding the formulation and physical properties test of lip tint preparations using beetroot extract (*Beta Vulgaris* L.,) where the lip tint preparation is at F0 , F1, F2 and F3 are homogeneous because there are no coarse grains or spots when applied to the glass object.

Based on the results of this research, it can be concluded that the akalifa leaf extract was successfully distributed evenly in the lip tint preparation, showing good homogeneity in

all formulas. Good homogeneity is very important to ensure that the active substances in lip tint can provide maximum and even effects with each use. The absence of coarse grains in the preparation indicates that the formulation technique used is optimal and in accordance with the expected quality standards.

The pH test is one of the things that needs to be considered in a topical preparation formulation. The pH test aims to determine whether the pH value of a preparation is acceptable to the skin. The pH value allowed for topical preparations is in the range of 4.5-7. Based on the results of pH testing on akalifa leaf extract lip tint preparations, it shows that all lip tint preparation formulas have the same pH value, namely 4.63, all of these preparation formulas are still said to be good because they are still within the physiological pH range of the lip skin, namely 4.5 - 7. This shows that the lip tint preparations made are safe and cannot cause irritation to the skin of the lips. The higher the concentration of akalifa leaf extract, the higher the pH of the lip tint preparation. Besides that, the more acid the lip tint preparation comes into contact with the skin, the more difficult it is for the skin to neutralize it and the skin will become dry, chapped and easily irritated.

Previous research by Gustaman (2023) shows that topical preparations with a pH value that matches the physiological pH of the skin tend to be more accepted by users and do not cause irritation. Apart from that, Yunita's research (2022) regarding lip tint formulations using beetroot extract also reported that the pH value of the preparation was in the range of 4.5-6.5, indicating consistency in producing a product that is safe and suitable for the skin.

This research shows that lip tint with akalifa leaf extract not only provides attractive color variations but is also safe to use on the skin of the lips. Further development can be focused on optimizing the formulation to maintain a stable pH and improve overall product quality. Thus, akalifa leaf extract has great potential to be used as an active ingredient in safe and high quality cosmetic products.

The irritation test is a test carried out to determine the occurrence of irritation after using a lip tint preparation. Based on the results of the irritation test, it showed that the lip tint preparation of akalifa leaf extract in all formulas did not cause a reaction when tested on 30 panelists. The parameters for observing irritation reactions are reviewed based on the presence of mild erythema or dryness at the application site, erythema that is clear and may spread beyond the application site, strong erythema and often spreads accompanied by edema that is noticed 4 hours after the irritation test is carried out using the Patch Test method or open patch test. on the lower arm.

Based on this data, it can be concluded that all lip tint preparations containing akalifa leaf extract are safe to use because they do not cause irritation reactions. This is influenced by the choice of akalifa leaf extract as a natural dye. Akalifa leaves contain high antioxidants which can play a good role in protecting the skin so as to minimize the occurrence of irritation reactions. Apart from that, the pH value of the lip tint preparation that corresponds to the pH value range of the skin on the lips also influences the irritation reaction because when the pH value is more or less than the normal range, it will be susceptible to irritation reactions (2).

Previous research by Yunita (2022) regarding the formulation and testing of the physical properties of lip tint preparations using beetroot extract (*Beta vulgaris* L.) as a natural

colorant also showed similar results where lip tint with beetroot extract did not cause an irritating reaction on the panelists' skin. These results show consistency in the use of natural dyes in lip tint preparations, which tend to be safe and do not cause irritation. Another study by Gustaman (2023) showed that there was no reaction on the skin after applying a red rice lip tint preparation with a combination of dragon fruit for 30 minutes. Referring to previous research, a preparation is said to be safe if it does not cause a reaction on the skin.

Based on the results of the research that has been carried out, it can be concluded that the lip tint preparation from akalifa leaf extract meets the irritation test requirements because it does not cause itching, redness or swelling on the skin. The spreadability test is a test carried out by panelists to determine whether the lip tint preparation is able to stick well to the skin. Generally, some consumers prefer lip tint preparations that are light and last long after being applied to the lips. The topical power test was carried out visually on the skin of the back of the hand 5 times. Lip tint preparations are said to produce good rubbing power if the smeared color on the back of the hand sticks to the back of the hand. On the other hand, the spreadability test is said to be bad if only a small amount of dye sticks when applied (Afni et al., 2021).

Based on the results of the spreadability test carried out, the lip tint preparations tested in this study showed satisfactory performance, with the ability to adhere well to the skin after being applied. These results are consistent with the findings of Yunita (2022) who emphasized the importance of low rubbing frequency to show good spreading power. The F3 formulation in this study showed the most optimal results, requiring only 5 applications to produce a color that sticks and is clearly visible.

The liking test is an assessment tested in research based on the level of liking of the panelists. To determine the level of consumer preference, after the formulation of the preparation it is necessary to conduct a preference test on several panelists. The panelists will fill out a questionnaire regarding the best formula according to each panelist's assessment. Then, the data will be known after calculating the percentage of preferences for each formula (Wahyuni, 2018).

Based on the research results, there were significant differences in the level of panelists' preferences for lip tint formulations based on the hedonic test. The One Way ANOVA test showed that variations in lip tint formulations had a significant effect on panelists' preferences in aspects such as shape, color and aroma ($F=36.041$, $p<0.05$). Normality test analysis using Kolmogorov-Smirnov and Shapiro-Wilk shows that the data for the variables like, color, and aroma meet the assumptions of normality ($p>0.05$), validating the suitability of the data distribution with a normal distribution. The homogeneity of variance test also showed no significant differences in variability between test groups for the liking variable ($p>0.05$), confirming that the assumption of homogeneity of variance was met. These results confirm that lip tint formulations have a real influence on consumer preferences, with the potential to guide the development of cosmetic products that are preferred by the market based on respondents' visual and sensory preferences.

The author concluded that the lip tint formulation in this study significantly influenced consumer preferences, especially through the influence of shape, color and aroma. This is in

line with previous research by Gustaman (2023) which emphasized the importance of hedonic tests on 30 panelists. This test was carried out to create cosmetic products that consumers liked. These results provide a strong basis for the development of more optimal cosmetic product formulations, taking into account market preferences and consumer expectations for lip tint products.

CONCLUSION

Based on the hedonic test, the formulation with a concentration of 16% akalifa leaf extract (F3) can be seen from the aspect of the highest value that is liked by the panelists. The formulation of lip tint preparations with akalifa leaf extract at concentrations of 10%, 13% and 16% meets the quality standards expected for cosmetic products.

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