



Utilization of Kepok Banana Peel Waste (*Musa Acuminata Colla*) as an Antioxidant Cream and Facial Moisturizer Preparation

Siti Sarah¹, Universitas Islam Negeri Ar-Raniry Banda Aceh, Indonesia

Reni Silvia Nasution², Universitas Islam Negeri Ar-Raniry Banda Aceh, Indonesia

Khairun Nisah³, Universitas Islam Negeri Ar-Raniry Banda Aceh, Indonesia

ABSTRACT

The utilization of bananas is currently not optimal, generally only the flesh of the banana is used while other parts of the banana peel can also be utilized because of its very good and abundant content. One of the contents found in banana peels is flavonoids. Flavonoids can be used as active ingredients in facial moisturizers because flavonoids can ward off free radicals, inhibit hydrolysis enzymes, oxidative and also anti-inflammatory. The purpose of this experiment was to determine the comparison of the effectiveness of facial moisturizers using ethanol extract of kapok banana peel (*Musa acuminata Colla*) and to determine the most effective formulation for moisturizing the face. This study was conducted by varying the ethanol extract of kepok banana peel (*Musa acuminata Colla*) 20%, 30%, and 40%. Tests conducted in this study included organoleptic tests, homogeneity tests, pH tests, melting point tests, smear power tests, spread power tests, effectiveness tests and antioxidant tests. The results of the organoleptic test showed that F1, F2 and F4 overall had a yellow color, semi-solid form and homogeneous composition of the preparation, while F3 showed results that were not in accordance due to the uneven composition of the preparation or the presence of coarse particles. The pH is in the normal skin range, namely 4.5-6.5. Has a melting point of 57°C - 62°C and produces good application power and good spreadability. The effectiveness test showed results of 59% (F1), 62% (F2) and 58% (F4) which showed an increase in moisture on the face. From the best results, namely F2 and F4, antioxidant activity was tested and the results were 87.2 µg / mL (F2) and 93.6 µg / mL (F4). It can be concluded that the best result of this test is F2.

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Corresponding Author:

Khairun Nisah

Universitas Islam Negeri Ar-Raniry Banda Aceh, Indonesia

khairun.nisah@ar-raniry.ac.id

Introduction

Bananas are one of the fruits that are very abundant in tropical areas such as Indonesia. Bananas have the Latin name *Musa Paradisiaca*. Bananas themselves have a short shelf life because they have a very high water content. The types of bananas are very varied, including cotton bananas, kepok bananas, jackfruit and others. Usually only the flesh of the banana is processed, so the skin is very rare and has not been utilized optimally and completely. Banana peels are currently one of the community wastes that are simply thrown away. In fact, banana peels contain starch, polyunsaturated fatty acids, linoleic acid, α linoleic acid, pectin, and essential amino acids, such as leucine, valine, phenylalanine and threonine. In addition, banana peels contain secondary metabolites, namely alkaloids, flavonoids, saponins and tannins. Flavonoids in banana peels can help with several facial problems, including eliminating acne, smoothing the skin, rejuvenating the skin, inhibiting premature aging (antioxidants) and also moisturizing the skin (Chan, A. et al. 2021).

Flavonoids are one of the largest natural phenol compounds found in green plants. Flavonoids are known to ward off free radicals, inhibit hydrolysis enzymes, oxidative and also anti-inflammatory. Flavonoids themselves are found in almost all parts of plants, both in fruit, roots, leaves, and the outer skin of the stem. From the benefits and content contained in flavonoids, flavonoids can play a role in degenerative through the mechanism of destroying the body's immune system, lipid and protein oxidation. Where one of the applications that can be used on the face is as a facial moisturizer (Aminah. et al. 2017).

Facial moisturizer is needed to maintain its structure and function. There are several factors that can cause dry skin, both internal and external factors. Naturally, the skin tries to protect itself. However, there are certain reasons why natural factors are not enough to moisturize the skin. Therefore, it takes external moisturizer or additional non-natural with the use of facial moisturizer (Purnamasari, R. .2020).

Flavonoids have been proven to moisturize the skin. The results of the study by Lifiani. R. et al. (2021) showed that flavonoids in addition to having high antioxidants can also moisturize the skin well. This study was conducted by extracting ethanol from African leaves (*Vernonia amygdalina del*) as a traditional cosmetic to moisturize the skin.

The skin moisturizing power contained in flavonoids is also proven by the study of Nelva & Rosalina., (2023). Where in this study it can be seen that the flavonoid content of 100 grams of sample contains 0.0035% flavonoids. This study tested the feasibility of oatmeal body scrub preparations and pegagan leaves (*Centella asiatica*) for dry skin care. The use of flavonoid compounds carried out in the study of Harnis. et al., (2022) by making dahlia tubers (*Dahlia variabilis*) as a facial mask that can moisturize and prevent acne due to the content of flavonoids, phenolics and tannins.

Moisturizer from watermelon fruit water extract (*Citrullus lanatus*) which has been done by Ekayanti. et al. (2019) by varying 10%, 20%, and 30% watermelon fruit water

extract (*Citrullus lanatus*) shows the data results the higher the concentration of the active ingredient, the better the moisturizing power.

Research conducted by Chan, A et al. (2021) shows that banana peel ethanol extract can moisturize the face well and the higher the concentration of banana peel ethanol extract, the higher the moisturizing power. The preparation used in this experiment was a sheet mask. The flavonoid content of banana peel has good moisturizing power as proven by research by Ayuningsih et al., (2023) In this study, golden banana peel (*Musa acuminata*) was used as a hand body cream. The results of this study also show that in addition to being able to moisturize, preparations from the results of golden banana peel extract (*Musa acuminata*) as an antioxidant that can protect the skin from premature aging. Based on the literature above, researchers are interested in extracting flavonoid content from kepok banana peel (*Musa Acuminata Colla*) as a facial moisturizer with a cream preparation and to find out how much flavonoid content is in banana peel.

Methods

Tools and materials

The tools used in this experiment are UV-Vis, rotary evaporator, blender, mesh sieve number 40, Erlenmeyer, dropper pipette, filter paper, hot plate, test tube, mortar and pestle, magnetic stirrer, sample pot, stirring rod, spatula, aluminum foil and skin analyzer.

The materials used in this experiment were banana peels. (*Musa acuminata Colla*), stearic acid ($C_{18}H_{36}O_2$), glyceryl monostearate ($C_{21}H_{42}O_4$), triethanolamine ($C_6H_{15}NO_3$), glycerin ($C_3H_8O_3$), propylene glycol ($C_3H_8O_2$), methyl paraben ($C_8H_8O_3$), propyl paraben ($C_{10}H_{12}O_3$), distilled water (H_2O), ethanol (C_2H_5OH), all ingredients used are pro-analyst and methanol Pa (CH_3OH).

Making Ethanol Extract by Maceration Method

The method used is maceration. A total of 200 g of the simplification that has been smoothed and blended is added with 1500 ml of 96% ethanol, soaked for 5 days (Nur, F, S., et al. 2022).

Sample Extraction Process With Rotary Evaporator

The thick extract obtained was then thickened with a rotary evaporator until the thick extract was obtained. Then the yield was calculated (Larasati & Putri, 2023).

Qualitative Analysis of Flavonoid Content

A total of 3 ml of banana peel ethanol extract was reacted with 1 ml of hydrochloric acid and magnesium, shaken vigorously. Positive results are indicated by the formation of red, orange, or yellow (Rosminar, L. et al. 2018).

Extract Preparation Before GC-MS Test

The thick extract variation of 1:1 was taken with one spatula and re-dissolved with ethanol. Then Na_2SO_4 was added to draw water, shaken and left for ± 30 minutes in a separating funnel, the solution was taken in the upper layer of the sample ready to run with GC-MS (Mirsyah, et al., 2022).

Identification of Kepok Banana Peel Compound Content with GC-MS

A sample of 1 μ L was injected into the GC-MS system, using helium gas as the mobile phase.

Making Facial Moisturizing Cream Preparations From Banana Peel Ethanol Extract (*Musa acuminata Colla*)

The stearic acid oil phase and glyceryl monostearate were heated at 70°C. Methyl paraben and propylene paraben were dissolved in propylene glycol heated at 70°C as the water phase. The oil and water phases were mixed in a hot mortar and then ground into a cream. Ethanol extract of banana peel was added slowly until homogeneous. Several variations of the cream preparation formula were made:

Table 1. Formulation Composition

Ingredients	Formula 1	Formula 2	Formula 3	Formula 4	Fungsi
Banana peel extract	10%	20%	30%	-	Active ingredients
Stearic acid	12%	12%	12%	12%	Emulsifying Agent
Glycerin	5%	5%	5%	5%	Humectant
Propylene glycol	3%	3%	3%	3%	Humectant & occlusive
Glyceryl monostearate	4%	4%	4%	4%	Emulsifier, Stiffening agent
TEA	1%	1%	1%	1%	Emulsifying agent
Methyl paraben	0,018%	0,018%	0,018%	0,018%	Preservative
Propyl paraben	0,02%	0,02%	0,02%	0,02%	Preservative
Aquades	Ad 100 ml	Ad 100 ml	Ad 100 ml	Ad 100 ml	Solvent

Organoleptic test (BPOM., 2019)

Organoleptic tests include changes in color, shape, aroma and consistency tested by 20 panelists. The specifications of facial moisturizer cream that must be met are to have a fragrant odor, homogeneous color of the preparation, and the form of the preparation.

Homogeneity Test (Lestari et al., 2021)

Dioleskan sejumlah sediaan pada kaca arloji dan diamati. Sediaan yang dioleskan harus menunjukkan susunan homogen dan tidak ada butiran kasar

pH test (Lestari et al., 2021)

Weigh each facial moisturizer cream preparation as much as 1 gram then put into a beaker glass and dissolved with 100 mL of distilled water above a water bath, then measure the pH using a pH meter that has been previously clarified with a standard buffer. Based on SNI 16-4799- 1998, the preparation should contain a skin pH of 4.5–8.

Melting Point Test (Rasyadi. et. al. 2022)

The facial moisturizer cream preparation is inserted into the capillary tube into the melting point device in the appropriate position. The temperature obtained when the facial moisturizer cream preparation begins to melt is the melting point of the facial moisturizer cream preparation. The requirements for the stated melting point are 50-70°C.

Spreadability Test (Lestari. dkk. 2021)

The smearing power test was conducted by applying a facial moisturizer cream preparation to the back of the hand and observing the amount of preparation that sticks and the resulting color. The treatment was repeated 3 times.

Spread Power Test (Lumentut. dkk. 2020)

Weigh 0.5 grams of facial moisturizer cream, then place it in the middle of the petri dish in an inverted position then leave it for 1 minute and give a load of 50 grams to 250 grams every 1 minute 50 grams. The standard spread of the cream is 5 cm-7 cm. Repetition is done with replication up to three times the performance.

Effectiveness Test (Handayani. dkk. 2021)

Effectiveness test of facial moisturizer cream preparation containing ethanol extract of kepok banana peel (*Musa Acuminata Colla*) this test was conducted on 20 panelists with the criteria of healthy women aged 19-23 years, which was applied to the back of the hand, before using the moisturizer the panelist's skin will be checked for moisture then after being applied the skin moisture is checked again. The parameters observed are oil content and water content.

Measurement of Antioxidant Activity by DPPH Method

The test was carried out by pipetting 1.5 ml of sample and reference solutions of various concentrations, then adding 3.0 ml of DPPH. Then vortexed and incubated at 37°C at room temperature in the dark. The absorbance was then measured using a UV-Vis spectrophotometer at a wavelength of 529 nm. As a negative control, a DPPH 20 ppm solution of 3.0 mL plus 1.5 mL of chloroform was used. From the absorbance data obtained, the antioxidant power of antioxidants can be calculated by calculating the % immersion using the formula:

$$\text{Calculation of \% inhibition} = \frac{\text{absorbansi kontrol} - \text{absorbansi sampel}}{\text{absorbansi kontrol}} \times 100$$

Result

Sample Preparation Process

The sample used in this study was the skin of Kepok banana (*Musa Acuminata Colla*). The initial step taken was sample determination, with the results in table 2 below.:

Table 2. Kepok Banana Peel Taxonomy Test Results

Classification	Result
Kingdom	<i>Plantae</i>
Class	<i>Magnoliophyta</i>
Ordo	<i>Zingeriberales</i>
Familia	<i>Musaceae</i>
Genus	<i>Musa</i>
Spesies	<i>Musa acuminata Colla</i>

According to (Ariani et al., 2022) drying is carried out with the aim of reducing water content, preventing a decrease in quality, sample damage due to microbes and can stop enzymatic reactions. Furthermore, the dried sample will be ground into a fine powder. This is in accordance with research (Asworo & Widwastuti, 2023) which states that particle size can affect the extraction process carried out. The smaller the particle size, the greater the contact surface area between the sample and the solvent.

The solvent used in this study was 96% ethanol. This type of solvent is used because it is selective, non-toxic, has good absorption and has high extraction capacity so that it can extract polar and non-polar compounds. Research shows that the higher the yield, the greater the extract produced. In this study, the yield of the extract obtained was 60%.

The extract that has been thickened with a rotary evaporator will be identified for its compound content using GC-MS (gas chromatography-mass spectrometry). The results showed the presence of 11 peaks of compounds which have a function as antioxidants. These compounds are (1) Acetic acid, hydroxy-, methyl ester, (2) 2,3-Butanediol, [R-(R*,R*)]-, (3) 2,3-Butanediol, [R-(R*,R*)]-, (4) 3-Furaldehyde, (5) Oxazolidine, 2-ethyl-2-methyl-, (6) 1-Methoxycyclohexane, (7) 5-Hepten-2-one, 6-methyl-, (8) Butanedioic acid, dimethyl ester, (9) Benzeneacetic acid, methyl ester, (10) Ageratriol and (11) 3-Furanacetic acid, 4-hexyl-2,5-dihydro-2,5-

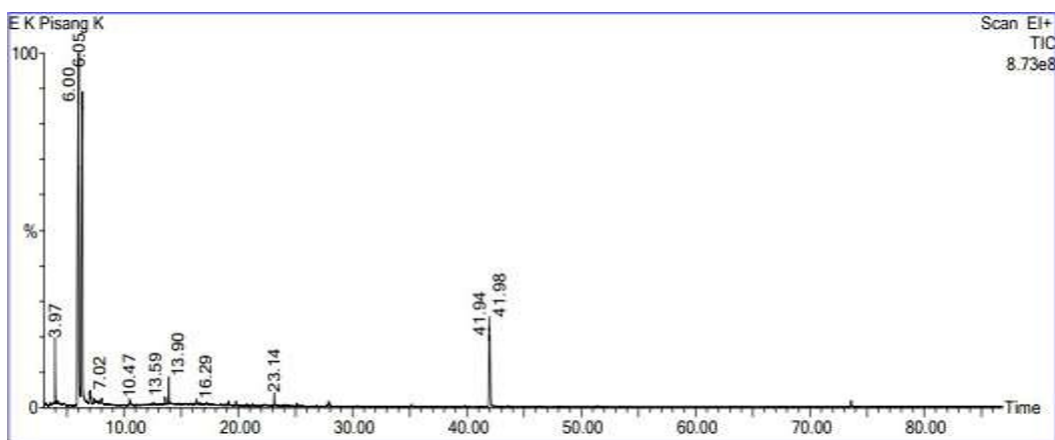


Figure 1. Kepok Banana Peel Chromatogram

The results of the identification of compounds from kepok banana peel using GC-MS can be seen in table 3 below.:

Table 3. Data from the Analysis of Chemical Compounds in Kepok Banana Peels

Compound Name	RT	Area %
Acetic acid, hydroxy-, methyl ester	3,968	2,263
3-Furaldehyde	7,020	0,532%
2,3-Butanediol, [R-(R*,R*)]-	6,046	36,836
2,3-Butanediol, [R-(R*,R*)]-	6,361	28,659
Oxazolidine, 2-ethyl-2-methyl-	10,469	0,618
1-Methoxycyclohexane	13,615	0,389

5-Hepten-2-one, 6-methyl-	13,895	1,319
Butanedioic acid, dimethyl ester	16,311	0,433
Benzeneacetic acid, methyl ester	23,139	0,693
Ageratriol	39,831	0,155
3-Furanacetic acid, 4-hexyl-2,5-dihydro-2,5-	41,984	8,714

The results of the flavonoid test showed that the extract of kepok banana peel positively contained flavonoids. This is indicated by the appearance of orange to red color in the solution. The change in the color of the solution to orange to reddish is caused by the formation of a complex between magnesium ions and phenoxy ions from flavonoid compounds. Reduction of flavonoid compounds in the extract using Mg²⁺ and concentrated HCl produces the complex [Mg(OAr)₆]⁴⁻, which has an orange color.

Making facial moisturizer preparations with variations in the concentration of kepok banana peel as much as 20% (F1), 30% (F2), 40% (F3) and not using kepok banana peel (F4). Then continued with physical tests of the preparations in the form of organoleptic tests, homogeneity tests, pH tests, melting point tests, spreadability tests, effectiveness tests and antioxidant tests.

Physical Stability Test of Preparation

Organoleptic Test of Preparation

Organoleptic tests include color, aroma and shape. The results show that the color of the F1 to F4 formulation preparations changes to a yellow color that becomes more concentrated as the concentration of the added extract increases. This is in line with research (Rasyadi et al., 2022) that the difference in color produced is influenced by the addition of extract concentration. The higher the extract added, the more concentrated the color produced. The color produced in this test is yellow. Then, in the results of the aroma of this facial moisturizer preparation, the results of formulations F1 to F4 have a waxy aroma, but as the concentration of the added extract increases, the waxy aroma fades and the banana peel aroma becomes more dominant. The results of the dosage form in the study were that the more extract concentration added, the more liquid the resulting dosage form would be. This is indicated by the presence of a liquid dosage form, namely in formulation F3. The following are the results of the organoleptic test of the facial moisturizer cream preparation from kepok banana peel (*Musa Acuminata* Colla):

Tabel 4. Hasil Uji Organoleptik Sediaan Pelembab Wajah

Formulation	Organoleptic Test			Panelists
	Colour	Aroma	Form	
F1	Faded Yellow Wax	Wax Aroma, Slight Banana Aroma	Semi Solid	20
F2	Yellow	Wax Aroma And Banana	Semi Solid	20
F3	Dark Yellow	Slight Wax Aroma, Distinctive, Banana aroma	Liquid	20
F4	White	Slight Wax Aroma	Semi Solid	20

Uji Homogenitas

Uji homogenitas sediaan bertujuan untuk memastikan bahwa pencampuran antara zat aktif dengan dasar krim dalam pembuatan krim terjadi secara merata. Penggunaan suhu pada 70°C ini disebabkan karena basis yang digunakan memiliki titik lebur pada suhu 60°C. menurut (Bagus dkk., 2020) pengadukan sangat berpengaruh pada hasil sediaan. Lama dan cepatnya pengadukan dapat memperluas bidang kontak sehingga dapat meningkatkan homogenitas suatu sediaan. Suatu sediaan harus menunjukkan hasil yang homogen agar tidak menimbulkan reaksi iritasi pada saat dia diaplikasikan. Hasil dari pengujian menunjukkan bahwa dari F1, F2 dan F4 memenuhi standar homogenitas yang baik. Hal ini ditunjukkan dengan tidak adanya partikel gumpalan saat krim dioleskan, struktur krim yang merata, serta warna yang seragam dari awal hingga akhir pengolesan. Sedangkan pada F3 menunjukkan butiran atau partikel kasar ketika di uji. Berikut adalah hasil dari uji homogenitas sediaan krim pelembab wajah dari kulit pisang kepok (*Musa Acuminata Colla*) :

Table 5. Hasil Uji Homogenitas Sediaan Pelembab Wajah.

Formulation	Hasil Uji Homogenitas
F1	Homogeneous
F2	Homogeneous
F3	Not Homogeneous
F4	Homogeneous

pH Test

The results of the pH test in this study were that formulations F1 to F4 had a pH in the range of 5.85-6.07. This is in accordance with the range of pH values contained in SNI 16-4399- 1996 as a quality requirement in skin moisturizer preparations (4.5 - 8.0). It is known that the pH range of normal skin on the face is 4.5 - 6.5. This can be said that the pH produced is in accordance with the standard and is included in the normal skin standard. According to (Yumas et al., 2016) the pH value in the preparation is very important to test, namely to determine the acidity level of the formulated preparation so that when applied, the face does not experience an irritation reaction. Preparations that have a pH of 5-6 are not much different from the physiological pH of the skin so that they can be accepted for application to the skin. If the preparation has a pH that tends to be alkaline, it will cause scaly skin, while preparations that have a pH tend to cause the skin to experience an irritation reaction. It can be concluded that the administration of banana peel extract in the facial moisturizer cream formulation affects the pH produced. However, it is still in the normal skin pH range.

Table 6. Results of pH Test of Facial Moisturizer Preparations.

Formulation	pH Test Result
F1	6,05
F2	6,05
F3	5,85
F4	6,07

Melting Point Test

This test is carried out with the aim of seeing the quality of the preparation in terms of resistance to storage and to see at what temperature the preparation will be damaged. The melting point value is influenced by the base used, especially the material that acts as the oil phase in the preparation. Stearic acid is known to be a long-chain saturated fat that is widely found in nature. According to (Islamiah & Simanullang, 2022) long-chain fatty acids tend to have a higher melting point compared to short-chain fatty acids. The results of the melting point in this test from F1 to F4 range from 57°C - 62°C. The melting point obtained is in accordance with existing provisions, namely 50°C -70°C.

Spreadability Test

This test is done visually by applying the preparation to the back of the hand. This is done to observe the amount of preparation that sticks to the back of the hand and to see the color that appears when it is applied. The results obtained, in the variation formulations F1, F2 and F4 have a spreadability result that causes a slight white color on the back of the hand so that the skin of the hand looks brighter. The preparation that sticks to the hand produces very good results, namely the preparation sticks evenly to the back of the hand. While for the F3 formulation, it was not tested on the back of the panelist's hand because it was not homogeneous. The following are the results of the spreadability test of the facial moisturizer cream preparation from kepok banana skin (*Musa Acuminata Colla*):

Table 7. Results of the Test of the Spreading Power of Facial Moisturizer Preparations.

Formula	Result
F1	Has good spreadability, low color intensity
F2	Has good spreadability, low color intensity
F3	-
F4	Has good spreadability, low color intensity

Spread Power Test

This test is carried out to see if a preparation has good spreading power by determining the softness of the mass so that the ease of application to the skin can be seen. The area of spread increases in line with the increase in the applied load; the greater the load, the wider the spread. The easier the preparation is to spread on the skin, the greater the surface area between the contact of the preparation and the skin so that the absorption of the preparation at the point of application will be more optimal. The results obtained in this test were that formulations F1 to F4 experienced an increase in spreading power along with the addition of the load. This is in accordance with research conducted by (Safitri et al., 2022), namely that the increasing spreading power when the load is added, the preparation has the ability to spread evenly. The results obtained ranged from 5.6 cm - 7.4 cm. which is in accordance with the requirements for spreading power, namely 5-7 cm.

Effectiveness Test

This test was conducted to see the moisture of the panelists' skin before and after applying the preparation to the face using a skin analyzer. This is to find out how effective the formulated preparation is in moisturizing the face. The results of this test

were that of the 20 panelists tested, the average skin moisture was 47%. After applying the preparation to the panelists' skin, there was an average increase in moisture of 59% (F1), 62% (F2) and 58% (F4). For the F3 formulation, it was not tested on the panelists because the homogeneity test did not show even results. This increase in skin moisture is due to the flavonoid content in the kepok banana peel which can function as a skin moisturizer. According to research conducted by (Lovena et al., 2021), the criteria for skin moisture are in the range of 30% (less moist), 30-50% (moist) and > 50% (very moist). It can be concluded that in this test the preparation has a moisturizing power in the very moist range. The following are the results of the effectiveness test of a facial moisturizer made from kepok banana skin (*Musa Acuminata Colla*):

Table 8. Results of the Effectiveness Test of Facial Moisturizer Preparations

Formula	Panelists' Average Skin Moisture (Before)	Panelist Average Skin Moisture Panelist Average (After)
F1	47%	59%
F2	47%	62%
F3	-	-
F4	47%	58%

Discussion

This antioxidant activity test aims to determine the antioxidant potential and the amount of IC50 value contained in the preparation. The measurement of the inhibitory activity value against DPPH free radicals uses the UV-Vis spectrophotometry method. The principle of this method is that good interaction between antioxidant compounds and DPPH through transfer or free radical electrons can neutralize the character of DPPH free radicals. The standard standard used in this study is vitamin C. According to (Rahmi et al., 2021) vitamin C is an antioxidant that can dissolve in water. Vitamin C is used as a positive control in this test because it is to see how much IC50 value is in the preparation with vitamin C used as a comparison. The results of the measurement of the vitamin C standard standard have an IC50 value of 1.5 μ g/mL. The next stage is to measure the sample using four concentrations. The use of various concentrations is to achieve a linear regression equation by calculating the % inhibition at each concentration. According to (Wijaya, 2019) the sample concentration is directly proportional to the % inhibition. Namely, % inhibition will increase if the concentration of the sample used is also higher. In this study, the % inhibition produced is greater with the increasing concentration of the sample. Then from the results of % inhibition, a linear regression equation is made using Excel Ms.word.

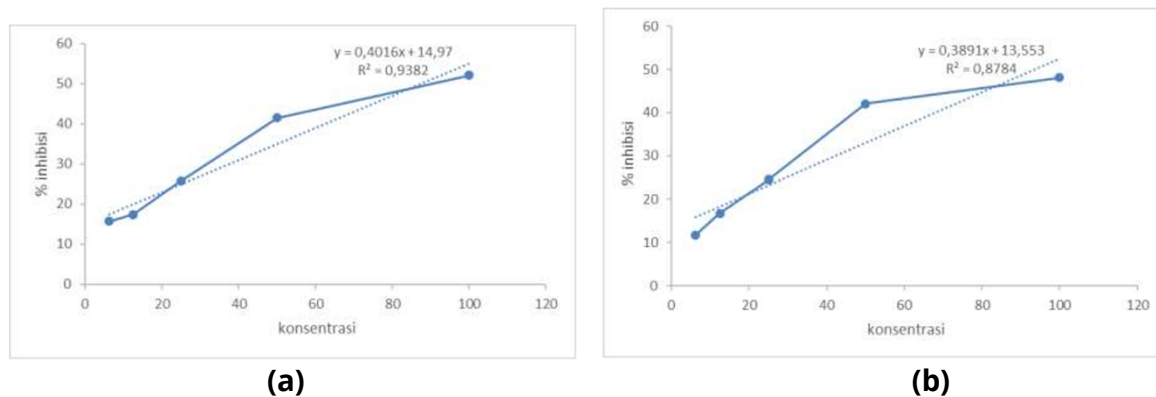


Figure 2. (a) Graph of Linear Regression Equation F2 (b) Graph of Linear Regression Equation F4

The following are the results of the antioxidant activity test of a facial moisturizer cream preparation made from kepok banana peel (*Musa Acuminata Colla*):

Table 9. Results of Antioxidant Activity Test of Facial Moisturizer Preparations.

Formula	Result
F2	87,2 µg/mL
F4	93,6 µg/mL

The equations obtained in this test are (F2) $y = 0.4016x + 14.97$ and (F4) $y = 0.3891x + 13.553$ which are then used to calculate the amount of IC50 contained in the sample. The results obtained in this test are F2 has an IC50 value of 87.2 µg/mL and F4 has an IC50 value of 93.6 µg/mL where the results of both IC50 values are included in the category of strong antioxidant activity ($50 < IC50 < 100$).

The results obtained are not in accordance with the study (Amalia et al., 2023), namely the test of the antioxidant activity of kepok banana peels with an IC50 result of 68.74 ppm. This can be caused by various factors, including the environment where the sample grows which can affect differences in chemical compound content and can also be influenced by the extract making process, extraction method, pH and temperature.

Conclusion

The conclusion of this study is that F1, F2 and F4 meet the physical test standards of the preparation and are effective in moisturizing the face. While for F3 showed results that were not in accordance because the homogeneity test showed an uneven composition of the preparation or the presence of coarse particles. The most effective formulation in moisturizing the skin of the face is F2 which can be seen from the results of the antioxidant test showing the highest results. F2 also showed the highest increase in moisturizing the panelist's skin.

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