International Journal Of Health, Engineering And Technology (IJHET) *E-ISSN 2829 - 8683*
Volume 4, Number 6, March 2026, *Page. 2710 - 2723*
Email : editorijhess@gmail.com

Formulation And Physical Quality Testing Of Face Toner Preparations Combining Moringa Leaf Infusion (Moringa Oleifera L.) And Butterfly Pea Flower (Clitoria Ternatea L.)

Sakila[1)], Annie Rahmatillah[2)], Vivin Marwiyati Rohmana[3)]
[1,2,3)] Bachelor of Pharmacy Study Program, Faculty of Health Sciences, Duta Bangsa University, Surakarta

*Corresponding Author
Email : sakilaskd2018@gmail.com

Abstract

Skin aging due to free radicals, pollution, and UV exposure causes dryness, roughness, and decreased elasticity, driving the demand for natural skincare alternatives to replace synthetic toners that often irritate sensitive skin. This study aims to formulate and test the physical quality of face toner from Moringa oleifera L. leaf infusion and Clitoria ternatea L. butterfly pea flower infusion, and determine the optimal formula. This type of development research uses a laboratory experimental approach using a quasi-experimental one-group posttest only design. The population is various potential face toner formulas; samples of three optimal formulas (F1: 3% moringa + 1% butterfly pea, F2: 2% + 2%, F3: 1% + 3%) were replicated three times (n = 9). Instruments include a pH meter, a Brookfield viscometer, a skin analyzer, and microscopic observations; quantitative descriptive data analysis, ANOVA, and post-hoc tests. The results showed that all formulas met the requirements: liquid form, mint scent, pH 6.26-6.50, viscosity 0.53-0.92 mPa.s, homogenous, non-irritating, and increased moisture by 50.81%. F2 was the most optimal with balanced viscosity. In conclusion, this face toner combination provides a stable and safe natural skincare option.

Keywords: Antioxidants, Clitoria Ternatea, Face Toner, Moringa Oleifera, Physical Quality Test.

INTRODUCTION

The skin is a vital organ that protects the body as a whole, with a sensitive and elastic anatomical structure that varies based on age, gender, body location, and race. As we age, the skin experiences changes such as roughness, dullness, and dryness due to exposure to free radicals, pollution, and ultraviolet rays that trigger redness, inflammation, and loss of moisture. Dry skin is characterized by roughness, scaliness, wrinkles, lack of elasticity, and feels dry to the touch, which is caused by reduced hydration of the stratum corneum. (Nurlitaningrum et al., 2025)(Wahyuni et al., 2023)

Environmental factors such as UV radiation and air pollution accelerate skin aging through oxidative stress and DNA damage, necessitating antioxidant protection. Cumulative UV exposure contributes up to 80% of facial aging, while pollutants such as SO2 damage skin texture and barrier function. This phenomenon is increasingly common in tropical regions like Indonesia, where outdoor activities increase the risk.

The main problem arises from the use of conventional cosmetics, which often contain harmful ingredients, causing mild to severe irritation to sensitive skin. Skincare treatments such as facial toners are necessary after cleansing the face to control sebum, remove makeup residue, refresh, and increase hydration as a percutaneous barrier. However, many synthetic products trigger negative reactions, so the development of natural formulas with humectants such as glycerin is an effective solution due to its ability to absorb water at high humidity and maintain the stability of the preparation. (Widayanti et al., 2023)(Ainiyah et al., 2025)(Ningsih et al., 2024)

Local Indonesian plants such as Moringa oleifera L. leaves are rich in flavonoids (myricetin, quercetin, kaempferol) with very high antioxidant activity (IC50 4.289), capable of neutralizing free radicals to protect skin cells. Similarly, butterfly pea flowers (Clitoria ternatea L.) contain anthocyanins as strong flavonoids with an IC50 of 87.86 ppm, indicating high potential as a source of stable antioxidants. The combination of the two has not been optimally explored in face toners, especially infusions, which require physical quality tests such as organoleptic, homogeneity, pH,

viscosity, irritation, and moisture to ensure quality and safety. (Susanty et al., 2019)(Cahyaningsih et al., 2019)

The problem is further complicated by the lack of a standardized formula for this combination infusion-based face toner, which has the potential to address dry skin caused by aging and pollution without the side effects of synthetic ingredients. Physical quality testing is needed to evaluate stability and effectiveness, considering that low viscosity (<5 cP), a pH of 4.5-6, and homogeneity are essential for comfortable application. Without this development, the public lacks safe and effective natural options.

This study aims to determine the results of physical quality testing of a face toner preparation combining infusions of Moringa oleifera L. leaves and Clitoria ternatea L. flowers, and to determine its optimal formula. The urgency lies in the need for natural solutions to the increasing problem of dry skin in an era of high pollution, providing benefits to agencies with formulation data, researchers through insight into plant combinations and approval requirements, and the public through information on safe products. The novelty of this study is the development of a face toner preparation combining infusions of both plants that were not previously available, complementing a separate study with a comprehensive quality evaluation.

RESEARCH METHODS

Types and Methods of Research

This study uses a type of development research (Research and Development) with a laboratory experimental approach to formulate and test the physical quality of a face toner preparation combining Moringa oleifera L. and Clitoria ternatea L. leaf infusions. The experimental method was chosen because it allows manipulation of independent variables such as infusion concentration to observe the effects on dependent variables in the form of physical quality parameters, in accordance with the principles of a quasi-experimental one-group posttest only design that is common in cosmetic formulations. This approach emphasizes iterative testing of the formula to achieve an optimal preparation that is stable, safe, and effective against dry skin caused by free radicals. (Sugiyono, 2023)(Creswell & Creswell, 2023)(Susanty et al., 2019)

Data Analysis Instruments and Techniques

Research instruments include laboratory equipment such as a pH meter (for measuring the ideal pH of 4.5-6), a Brookfield viscometer (for viscosity <5 cP), a UV-Vis spectrophotometer (for homogeneity and antioxidant potential), a digital microscope (for organoleptic observations such as color, odor, and texture), and patch tests on rabbit skin or the RHE model for irritation and moisture testing. Data analysis techniques are descriptive quantitative, including direct numerical measurements, comparisons between formulas using tables and graphs, and simple statistical tests such as ANOVA if necessary to determine the significance of differences. Organoleptic data are analyzed qualitatively using a hedonic scale, while stability is evaluated over 4-8 weeks of storage. This technique ensures the objectivity and reliability of the results according to BPOM standards for cosmetics. (Sudaryono, 2022)(Emzir, 2024)(Ningsih et al., 2024)

Population and Sample

The study population was various potential face toner formulas based on Moringa leaf and butterfly pea flower infusions with varying concentrations (e.g. F1: 2.5%+2.5%, F2: 4%+4%, F3: 5%+5%), which represent natural topical preparations for facial skin care. Samples were taken purposively with a total sampling technique from the three best formulas based on initial tests, each of which was recreated three times (n=3) for replication, resulting in 9 main samples plus a control. This selection took into account the availability of local Indonesian ingredients and relevance to dry skin problems, ensuring representativeness without broad generalizations. (Wahyuni et al., 2023)(Cahyaningsih et al., 2019)

Research Procedures

The procedure begins with the collection of materials such as fresh Moringa leaves and butterfly pea flowers, followed by infusion extraction (leaves and flowers are chopped, soaked in hot water at 80-90°C with Tween 80 for 15-30 minutes, filtered to 100 mL). The formulation is carried out by mixing the infusion (various concentrations) into a toner base containing glycerin as a humectant, distilled water, PEG-40, and preservatives, stirred homogeneously until the pH is adjusted. Physical quality testing includes organoleptic (visual and sensory observation), homogeneity (centrifugation 3000 rpm/30 minutes), pH, viscosity, irritation (patch test 24-48 hours), and moisture (moisture content analyzer), carried out on days 0, 7, 14, 21, 28. The data is summarized and the best formula is selected based on the criteria of meeting the standards (pH 4.5-6, stable viscosity, non-irritant). The entire process is carried out in a pharmaceutical laboratory with sterility protocols to ensure safety. (Ainiyah et al., 2025)(Nurlitaningrum et al., 2025)(Widayanti et al., 2023).

RESULTS AND DISCUSSION

Determination of Moringa Leaf Plants and Butterfly Pea Flowers

Determination of Moringa oleifera L. and Clitoria ternatea L. plants was carried out at the Functional Service Unit of Dr. Sardjito General Hospital under the name UPF Hortus Medicus located in the Tlogodringo Aromatic Garden, Tawangmangu, Karanganyar Regency, Central Java Province.

Making Infusion

Infusion is made from 20% w/v of Moringa leaves and butterfly pea flowers in the following way: Weigh 100 grams of Moringa leaves and butterfly pea flowers each, then put them into an infusion pan, add 500 ml of distilled water. The butterfly pea leaves and butterfly pea flowers that have been added with distilled water are heated using a water heater for 15 minutes after the pan temperature reaches 90°C, while stirring occasionally. Strain while hot using a flannel cloth, making 500 ml of infusion. If the volume is less than 500 ml, hot water can be added that is passed over the dregs of Moringa leaves and butterfly pea flowers until 500 ml of Moringa leaf and butterfly pea flower infusion is obtained (Rahmatillah et al., 2025).

Phytochemical Screening of Infusa

Phytochemical screening tests in test tubes include tests for alkaloids, flavonoids, steroids, terpenoids, tannins, and saponins. The purpose of the phytochemical screening test is to determine the levels of secondary metabolites in infusions of Moringa oleifera L. leaves and Clitoria ternatea L. flowers.

Table 1. Phytochemical Screening of Moringa Leaves

No.	Compound Groups	Reagent	Reaction Results	Result Description	Reference Results(Putri, 2025)
1.	Alkaloid	Mayer	+	orange, there is white sediment	A white precipitate forms, the solution is orange.
		Wagner	+	cloudy brown, there is brown sediment	A brown precipitate forms, the solution is cloudy brown.
		Dragendorf	+	yellow, with orange sediment	Orange precipitate forms, solution is yellow
2.	Flavonoid	Mg powder + concentrated HCl	+	Orange	Orange in color
3.	Tannin	FeCl3 5%	+	Blackish green in color	Blackish green in color

4.	Steroids	Liberman reagent	+	Cloudy green	Cloudy green
5.	Terpenoid	Liberman reagent	-	No brown ring formed	There are no brownish rings
6.	Saponin	Aquades + HCl 2 N	+	There is foam	There is foam when adding HCl

Information :
(+) = Secondary metabolite compounds identified (positive)
(-) = Secondary metabolite compounds identified (negative)

Table 2. Phytochemical Screening of Butterfly Pea Flowers

No.	Compound Groups	Reagent	Reaction Results	Result Description	Reference Results(Putri, 2025)
1.	Alkaloid	Mayer	+	orange, there is white sediment	A white precipitate forms, the solution is orange.
		Wagner	+	cloudy brown, there is brown sediment	A brown precipitate forms, the solution is cloudy brown.
		Dragendorf	+	yellow, with orange sediment	An orange precipitate forms, the solution is yellowish red.
2.	Flavonoid	Mg powder + concentrated HCl	+	Orange	Purple in color
3.	Tannin	FeCl35%	+	Blackish green in color	Blackish green in color
4.	Steroid	Liberman reagent	+	Cloudy green	Cloudy green
5.	Terpenoid	Liberman reagent	-	No brown ring formed	There are no brownish rings
6.	Saponin	Aquades + HCl 2 N	+	There is foam	There is foam when adding HCl

Information :
(+) = Secondary metabolite compounds identified (positive)
(-) = Secondary metabolite compounds identified (negative)

Preparation Results*Face Toner*

The face toner preparation is made with 3 formulations that have a concentration of moringa leaf infusion and butterfly pea flowers.each formula, namely in F1, the infusion of moringa leaves was 3% with a combination of 1% butterfly pea flower infusion, in F2, the infusion of moringa leaves and butterfly pea flowers was used at a concentration of 2% each, and in F1, the infusion of moringa leaves was 1% with a combination of 3% butterfly pea flower infusion.

Physical Quality Test Results for Face Toner Preparations

Organoleptic Test

Organoleptic tests are carried out to see the physical appearance of the face toner preparation, including the shape, color and smell of each formulation of the preparation that has been made.(Azizah et al., 2024)The results of visual organoleptic observations can be seen in table 3.

Table 3. Organoleptic Test Results of Face Toner Preparations

Organoleptic Observation	F0	F1	F2	F3
Form	Liquid	Liquid	Liquid	Liquid
Aroma	Typical mint	Mint Special	Mint Special	Mint Special
Color	White	Light green	Light blue	Blue

Ph Test

A pH test was conducted to ensure that the facial toner containing moringa leaf and butterfly pea flower infusions was safe for use and did not cause skin irritation. According to SNI 16-4399-1996, the permissible pH for skincare products is between 4.5 and 8.0.The results of pH measurements of the preparations carried out using a pH meter can be seen in table 4.

Table 4. Results of pH Test of Face Toner Preparations

Formula	Replication			Average	Information
	1	2	3		
F0	6.08	6.45	6.47	6.33	ualify
F1	6.13	6.42	6.22	6.25	Qualify
F2	6.61	6.22	6.66	6.49	ualify
F3	6.19	6.22	6.38	6.26	ualify

Analysis of data obtained from the pH test of a face toner preparation combining moringa leaf infusion and butterfly pea flower showed that the average pH of the face toner preparation was in the range of 6.26-6.50. The pH test results can be seen in Table 5.

Table 5. Analysis of pH Test Data for Preparations*Face Toner*

Formula	Mean ± SD	p-value
F0	6.33 ± 0.22	
F1	6.26 ± 0.15	0.412
F2	6.50 ± 0.24	
F3	6.26 ± 0.10	

Based on table 6, the results obtained from the post hoc pH test of the preparation*face toner*The combination of Moringa leaf and butterfly pea flower infusions showsthat of the four formulas there was no significant difference in pH value between formulas, even though there was variation in the concentration of active ingredients.

Table 6. Results of Post Hoc Test of pH of Preparations*Face Toner*

Formula	Treatment group	Sig	Information
Formula 0	Formula 1	1,000	There is no difference
	Formula 2	1,000	There is no difference
	Formula 3	1,000	There is no difference
Formula 1	Formula 0	1,000	There is no difference
	Formula 2	0.919	There is no difference
	Formula 3	1,000	There is no difference
Formula 2	Formula 0	1,000	There is no difference
	Formula 1	0.919	There is no difference
	Formula 3	0.981	There is no difference
Formula 3	Formula 0	1,000	There is no difference
	Formula 1	1,000	There is no difference
	Formula 2	0.981	There is no difference

Homogeneity Test

The homogeneity test is carried out by taking a sample of the face toner preparation, then dropping it on a watch glass and observing whether there are coarse particles in the preparation or not.(Azizah et al., 2024)Based on the results of the homogeneity test, it is known that the four formulas have met the requirements.There are no coarse particles. The results of the homogeneity test for the face toner preparation can be seen in Table 7.

Table 7. Results of the Homogeneity Test of Face Toner Preparations

Formula	Homogeneity	Information
F0	Homogeneous	Qualify
F1	Homogeneous	Qualify
F2	Homogeneous	Qualify
F3	Homogeneous	Qualify

Viscosity Test

The viscosity test on the face toner formula was carried out using a Stormer (Brookfield) viscometer.with spindle number 1 at a speed of 60 rpm. Testing was conducted three times for each formulation. Based on the viscosity test results table for the face toner preparation combining moringa leaf infusion and butterfly pea flower, the average result was 0.53-0.92 mPa.s, meeting the standard requirements for good face toner viscosity, which is less than 5 cPs.(Sari et al., 2021)The results of the viscosity test of the face toner preparation can be seen in table 8.

Table 8. Viscosity Test Results of Face Toner Preparations

Formula	Replication (mPa.s)			Average (mPa.s)	Information
	1	2	3		
F0	0.51	0.54	0.54	0.53	Qualify
F1	0.60	0.63	0.65	0.62	Qualify
F2	0.61	0.68	0.75	0.68	Qualify
F3	0.89	0.92	0.95	0.92	Qualify

Analysis of data obtained from the viscosity test of the face toner preparation combining Moringa leaf infusion and butterfly pea flower showed that the average viscosity of the face toner preparation was in the range of 0.53-0.92 cPs. The viscosity test results can be seen in Table 9.

Table 9. Analysis of Preparation Viscosity Test Data*Face Toner*

Formula	Mean ± SD	p-value
F0	0.53 ± 0.02	
F1	0.63 ± 0.03	<0.001
F2	0.68 ± 0.07	
F3	0.92 ± 0.03	

Based on Table 10, the results of the post-hoc viscosity test of the face toner preparation combining moringa leaf and butterfly pea flower infusions show significant differences between several formulas, particularly in the formula containing the highest concentration of active ingredients. Formula 3 showed a significant difference compared to formulas 0, 1, and 2.

Table 10. Post Hoc Test Results of Preparation Viscosity*Face Toner*

Formula	Treatment group	Sig	Information
Formula 0	Formula 1	0.122	There is no difference
	Formula 2	0.012	There is a difference
	Formula 3	0,000	There is a difference
Formula 1	Formula 0	0.122	There is no difference
	Formula 2	0.900	There is no difference
	Formula 3	0,000	There is a difference
Formula 2	Formula 0	0.012	There is a difference
	Formula 1	0.900	There is no difference

Formula 3	Formula 3	0.001	There is a difference
	Formula 0	0,000	There is a difference
	Formula 1	0,000	There is a difference
	Formula 2	0.001	There is a difference

Irritation Test

Based on table 11, the results of the irritation test for the face toner preparation, a combination of Moringa leaf infusion and butterfly pea flower, are stated to be good if the preparation used does not cause reactions such as redness of the skin, itching, or swelling.

Table 11. Results of Irritation Test of Face Toner Preparations

Formula	Reaction	Number of Panelists	Information
F0	Redness	-	No irritation occurs
	Itchy	-	
	Swollen	-	
F1	Redness	-	No irritation occurs
	Itchy	-	
	Swollen	-	
F2	Redness	-	No irritation occurs
	Itchy	-	
	Swollen	-	
F3	Redness	-	No irritation occurs
	Itchy	-	
	Swollen	-	

Humidity Test

Based on table 12, the results of the moisture test of the face toner preparation using a combination of Moringa leaf infusion and butterfly pea flower show that all four formulations are able to increase the water content in the skin, with an average of 50.81. This indicates that the face toner preparation has a very good hydration effect.

Table 12. Results of Moisture Test of Face Toner Preparations

		Humidity %						
			After Use of Preparation					
Formula	Panelists	Before Usage	Day 1	Day 2	Day 3	Day 4	Day 5	Flat -flat
F0	IR	39.5	52.6	51.9	59.8	59.1	57.7	56.22
F1	AP	48.6	57.3	76.2	63.5	58.7	53.8	61.9
F2	TR	48.9	55.3	57.4	60.1	57.5	57.2	57.5
F3	NR	44.5	68.7	56.2	50.3	57.5	60.1	58.56
F0	EA	53.8	55.3	57.5	45.2	52.2	49.5	51.94
F1	KS	38.0	47.5	46.5	52.9	51.7	55.0	50.72
F2	ZA	22.0	48.4	62.6	63.3	64.0	62.3	60.12
F3	NS	40.2	46.8	51.5	54.6	49.1	52.1	50.82
F0	DS	55.4	59.8	58.8	50.2	57.2	56.8	56.56
F1	FR	48.3	50.4	55.5	58.4	57.2	55.3	55.36
F2	AP	37.4	47.7	46.0	49.9	56.7	59.8	52.02
F3	TA	45.4	48.0	69.6	52.8	58.4	57.6	57.28

Based on the results of the humidity data analysis test, it can be seen in table 13.

Table 13. Analysis of Moisture Test Data for Face Toner Preparations

Formula	Mean ± SD	p-value
F0	5490.67 ± 257.48	
F1	3742.33 ± 2714.82	0.574
F2	3929.67 ± 2933.32	
F3	5555.33 ± 414.88	

Based on table 14, the results obtained from the post hoc test of the humidity of the preparation*face toner*combination of moringa leaf and butterfly pea flower infusionshows that there is no significant difference in the humidity value between formula 0, formula 1, formula 2, and formula 3. All formulas have relatively uniform humidity values and are not statistically significantly different.

Table 14. Results of Post Hoc Test of Moisture Content of Preparations*Face Toner*

Formula	Treatment group	Sig	Information
Formula 0	Formula 1	1,000	There is no difference
	Formula 2	1,000	There is no difference
	Formula 3	1,000	There is no difference
Formula 1	Formula 0	1,000	There is no difference
	Formula 2	1,000	There is no difference
	Formula 3	1,000	There is no difference
Formula 2	Formula 0	1,000	There is no difference
	Formula 1	1,000	There is no difference
	Formula 3	1,000	There is no difference
Formula 3	Formula 0	1,000	There is no difference
	Formula 1	1,000	There is no difference
	Formula 2	1,000	There is no difference

DISCUSSION

Determination of Moringa Leaf Plants and Butterfly Pea Flowers

Determination of Moringa oleifera L. and Clitoria ternatea L. plants was carried out at the Functional Service Unit of Dr. Sardjito General Hospital under the name of UPF Hortus Medicus located in the Tlogodringo Aromatic Garden, Tawangmangu, Karanganyar Regency, Central Java Province. The purpose of the plant determination process was to determine that the plants used in the study were indeed Moringa oleifera L. and Clitoria ternatea L. plants.

Based on the determination results in Appendix 2, it shows that the plants used for the research are indeed Moringa oleifera L. and Clitoria ternatea L.

Infusion Making Process

Infusion is made from 20% w/v of Moringa leaves and butterfly pea flowers in the following way: Weigh 100 grams of Moringa leaves and butterfly pea flowers each, then put them into an infusion pan, add 500 ml of distilled water. The butterfly pea leaves and butterfly pea flowers that have been added with distilled water are heated using a water heater for 15 minutes after the pan temperature reaches 90°C, while stirring occasionally. Strain while hot using a flannel cloth, making 500 ml of infusion. If the volume is less than 500 ml, hot water can be added that is passed over the dregs of Moringa leaves and butterfly pea flowers until 500 ml of Moringa leaf and butterfly pea flower infusion is obtained (Rahmatillah et al., 2025).

Phytochemical Screening of Infusa

Phytochemical screening tests using test tubes included tests for alkaloids, flavonoids, terpenoid steroids, tannins, and saponins. The purpose of the phytochemical screening test was to determine the levels of secondary metabolites in infusions of Moringa oleifera L. leaves and Clitoria ternatea L. flowers. The results of the phytochemical screening of Moringa leaves and Clitoria ternatea L. flowers are listed in Appendix 6 and Appendix 7.

Based on the results of the phytochemical screening test, moringa leaf infusion*(Moringa oleifera L.)*and butterfly pea flowers*(Clitoria ternatea L.)*It is known to contain secondary metabolite

compounds such as alkaloids, flavonoids, tannins, steroids, terpenoids, and saponins. Testing for alkaloid compounds yielded positive results with several different reagents. The reaction with Mayer's reagent produced a white precipitate, while Wagner's reagent produced a cloudy brown precipitate.*Dragendorff*producing an orange precipitate. This result indicates the presence of alkaloid compounds in the infusion, and is consistent with previous research that found that infusions of moringa leaves and butterfly pea flowers contain alkaloid compounds.(Putri et al., 2025)The flavonoid compound test was carried out by mixing magnesium powder and concentrated HCl solution, which was dissolved in an infusion of moringa leaves and butterfly pea flowers. A positive reaction was indicated by the formation of an orange color in the solution, indicating the presence of flavonoid compounds in the moringa leaf infusion and a purple color in the butterfly pea flowers.(Putri et al., 2025).Dadand testing of tannin compounds is done by adding$FeCl_3$In the infusion solution, a positive reaction is indicated by the formation of a blackish-green color, indicating the presence of tannin compounds in the infusion of moringa leaves and butterfly pea flowers.(Putri et al., 2025). In testing for terpenoid steroid compounds, anhydrous acetic acid and concentrated sulfuric acid were added. The test results for steroid compounds showed the formation of a cloudy green color, and the test results for terpenoid compounds were negative, as no brown ring was formed.(Putri et al., 2025). In testing the saponin compound, aquadest was added and then shaken to obtain a positive result, indicated by the presence of foam after the addition of 2 N HCl, which indicates the presence of saponin compounds in the infusion of moringa leaves and butterfly pea flowers.(Putri et al., 2025).

Dosage Formulation*Face Toner*

The formula for the face toner preparation, a combination of moringa leaf infusion and butterfly pea flower, is a modification adapted from research.(Asmarani et al., 2025). In this study, the thing that differentiates the research is the use of active ingredients in each formula, namely in F1, the infusion of moringa leaves was 3% with a combination of 1% butterfly pea flower infusion, in F2, the infusion of moringa leaves and butterfly pea flowers was used at a concentration of 2% each, and in F1, the infusion of moringa leaves was 1% with a combination of 3% butterfly pea flower infusion.

Making face toner preparations by preparing all the ingredients according to the face toner formula such as Moringa leaf and butterfly pea flower infusion, glycerin, tween 80, phenoxyathanol, peppermint oleum, and distilled water. The next step is to develop tween 80 with 5 ml of hot water in a mortar, stir until homogeneous. Then add glycerin and stir until homogeneous, other additional ingredients are then mixed and added distilled water gradually while stirring so that the ingredients are evenly mixed until homogeneous then filtered using filter paper and transferred into a toner container. The formulated face toner preparation is then tested to determine the feasibility of the toner made to meet the requirements.

Physical Quality Test of Face Toner Preparations

Physical quality testing of face toner preparations was conducted to determine whether the toner met the required quality. The physical quality testing of the face toner in this study included organoleptic testing, pH testing, homogeneity testing, viscosity testing, irritation testing, and moisture testing.

Organoleptic Test

Organoleptic tests are carried out to see the physical appearance of the face toner preparation, including the shape, color and smell of each formulation of the preparation that has been made.(Azizah et al., 2024)The results of visual organoleptic observations can be seen in table 3.

Based on the table of organoleptic examination results of the face toner preparation, the form of the four formulas has the same form, namely liquid. Meanwhile, regarding the aroma of the four formulas of the face toner preparation, the preparation shows a distinctive mint aroma. The color produced in F0 is white, the color for F1 is light green, the color for F2 is light blue, while in F3 it has a blue color. Based on research (Kadarul et al., 2023) the formula is declared stable if its physical characteristics remain consistent during the storage period, changes in color, the form of the preparation are generally influenced by temperature, environment, air in the storage room. Overall,

the organoleptic test results meet the organoleptic requirements as a good topical preparation for further testing.

pH test

A pH test was conducted to ensure that the facial toner containing moringa leaf and butterfly pea flower infusions was safe for use and did not cause skin irritation. According to SNI 16-4399-1996, the permissible pH for skincare products is between 4.5 and 8.0.The results of pH measurements of the preparations carried out using a pH meter can be seen in table 4.

Based on the table of pH test results on the face toner preparations from the four formulas produced, it shows that the preparations are still considered stable because they are within the skin pH range that is safe and comfortable to use. The pH test F0 showed an average result of 6.33, the pH test F1 showed an average result of 6.25, the pH test F2 showed an average result of 6.49, while the pH test F3 showed an average of 6.26. Although there are differences in pH values in the formulations, the resulting pH difference is still relatively small and does not show a significant change, this is in accordance with research (Ningsih et al., 2024). The test results show that the preparations have met the pH criteria for topical preparations in harmony with the skin's natural pH and do not cause irritation.(Asmarani et al., 2025).

Based on the results of data analysis on the average pH test of face toner preparations in the range of 6.26-6.50, meeting the safe pH requirements for topical skin use. These results indicate that each variation of formulas does not have a significant effect on the pH value of the face toner preparation resulting from the ANOVA test with a p value > 0.05 (0.412). Formula 2 has the highest pH value of 6.50 ± 0.24, while Formula 1 and Formula 3 have the lowest pH values of 6.26 ± 0.15 and 6.26 ± 0.10. Although there are numerical differences, these differences are not statistically significant, so all formulas are declared homogeneous in terms of the physical quality test of pH. Analysis of pH test data can be seen in table 5.

Based on the results of a post hoc test on the parameters of face toner preparations with varying infusion concentrations, it was found that formulas 0, 1, 2, and 3 did not show significant differences in pH values, despite variations in active ingredient concentrations. This indicates that the buffer system and preparation base are able to maintain pH stability, so changes in active ingredient concentration do not significantly impact the final pH of the product. This pH stability may be due to the use of additional ingredients such as buffers, humectants, and emulsifiers that are able to maintain ionic balance in the preparation system. Furthermore, the active ingredients used likely have relatively stable chemical properties within the concentration range used. Variations in plant extract concentration in topical formulations do not always significantly affect pH, especially if the formulation system has been designed to be stable (Pratiwi et al., 2021).

Homogeneity Test

The homogeneity test is carried out by taking a sample of the face toner preparation, then dropping it on a watch glass and observing whether there are coarse particles in the preparation or not.(Azizah et al., 2024).The results of the homogeneity test for the face toner preparation can be seen in table 7.

Based on the results of the homogeneity test, it is known that the four formulas have met the requirements because there are no coarse particles left in the face toner preparation. The combination of Moringa leaf infusion and butterfly pea flowers is mixed evenly so that the preparation looks clear, this is supported by research.(Azizah et al., 2024)This shows that the resulting face toner preparation is homogeneous.

Viscosity Test

The viscosity test on the face toner formula was carried out using a Stormer (Brookfield) viscometer.with spindle number 1 at 60 rpm. The face toner preparation was placed in a 100 ml beaker. After that, the attached spindle was lowered until it was immersed in the preparation. The test was performed three times for each formulation. The standard viscosity of a good face toner is less than 5

cPs.(Sari et al., 2021)The results of the viscosity test for the face toner preparation can be seen in table 4.8.

Based on the table of viscosity test results for the face toner preparation, a combination of Moringa leaf infusion and butterfly pea flower, the average result of the preparation was 0.53-0.92 mPa.s, fulfilling the standard requirements for good face toner viscosity, which is less than 5 cPs.(Sari et al., 2021)This is also supported by research conductedNurlitaningrum et al., (2025)that the viscosity value of the face toner preparation obtained a value of less than 5cPs, so that the viscosity test of the face toner preparation with a combination of Moringa leaf infusion and butterfly pea flowers in the four formulas has met the requirements.

Analysis of data obtained from the viscosity test of the face toner preparation combination of Moringa oleifera L. and Clitoria ternatea L. leaf infusion showed that the viscosity value of the preparation was in the range of 0.53 ± 0.02 to 0.92 ± 0.03, with the lowest value in Formula 0 (0.53 ± 0.02) and the highest value in Formula 3 (0.92 ± 0.03). The results of statistical analysis using the ANOVA test showed a p-value <0.001 ($p < 0.05$), which indicated that there was a statistically significant difference between the formulas on the viscosity value of the face toner preparation. Formula 3 with the highest viscosity had the thickest consistency, making it difficult to spread, and reducing comfort during use. Conversely, Formula 0 with the lowest viscosity tends to be thinner, making it easier to apply, but can reduce the stability of the preparation during storage. Therefore, Formula 1 and Formula 2 are considered to have a more balanced viscosity, thus potentially providing the best combination of stability and comfort of use. Formula 2 has a viscosity value of 0.68 ± 0.07, which is in the optimum and balanced range, that is, not too thin and not too thick. Compared with Formula 0 which has the lowest viscosity and Formula 3 which has the highest viscosity, Formula 2 is considered to be able to provide the best balance between physical stability and comfort when used. Analysis of viscosity test data can be seen in table 9.

The results of the post hoc test showed significant differences between several formulas, particularly those containing the highest concentration of active ingredients. Formula 3 showed a significant difference compared to formulas 0, 1, and 2. This indicates that increasing the concentration of active ingredients in the formulation affected the viscosity test parameters. This significant difference is thought to be related to the increased amount of active compounds contained in formula 3, thus affecting the physical and chemical characteristics of the formulation. The higher the concentration of active ingredients, the greater the interaction with the preparation base, which can ultimately affect the stability and physical properties of the product. The absence of significant differences between formulas 0 and 1, as well as between formulas 1 and 2, indicates that the differences in active ingredient concentrations within this range were not large enough to produce statistically significant changes. This may be due to the nature of the preparation base, which is still able to maintain the physical and chemical stability of the product even with small increases in active ingredient concentration. Relatively small differences in active ingredient concentrations do not necessarily result in significant changes in the physical characteristics of topical preparations (Pratiwi et al., 2021). Furthermore, mixing homogeneity, emulsion system stability, and the type of additives used in the formulation also play a significant role in determining the final characteristics of the product. A good formulation system maintains product stability despite variations in active ingredient concentration. Therefore, formulas 0, 1, and 2 still exhibit relatively uniform characteristics.

Irritation Test

Irritation testing on face toner preparations was carried out by dabbing the face toner product on a cotton pad, then rubbing it on the inner arm of female panelists aged 20-25 years, then waiting for 30 minutes, observing to see if there were any reactions such as redness, swelling, or itching on the skin. (Gobel et al., 2025).The presence of red skin is marked (+), itching (++), swelling (+++) and those who do not show a reaction are marked (-)(Yusriyani et al., 2024)The results of the irritation test for the face toner preparation can be seen in table 11.

Based on the irritation test results table, the combination of moringa leaf and butterfly pea flower infusions on the face toner preparation was declared good if the preparation used did not cause reactions such as redness, itching, or swelling. This test aims to determine whether a cosmetic product can cause skin irritation upon application. Generally, symptoms of skin irritation are characterized by redness, itching, or swelling in the exposed area.(Wahyuni et al., 2023). Referring to the results in the table, it can be concluded that all four face toner formulas do not cause skin irritation and can therefore be declared safe for use on the skin.

Humidity Test

Moisture testing of the face toner was conducted on the inner arms of female panelists aged 20–25 years. Moisture was measured using a skin analyzer 30 minutes before and after application.(Hasrizal et al., 2025). Percentage scale: dry (0-45%), normal or moist (46-55%), very moist (56-100%)(Wahyuni et al., 2023)The results of the moisture test for the face toner preparation can be seen in table 12.

Based on the table of moisture test results for the face toner preparation, a combination of Moringa leaf infusion and butterfly pea flower, it shows that all four formulations are able to increase the water content in the skin, with an average of 50.81. This indicates that the face toner preparation has a very good hydration effect.(Hasrizal et al., 2025)The moisture test aimed to determine the moisture level of the face toner preparation on the skin, which was tested for 5 consecutive days using a skin analyzer on four panelists. The results of the moisture test showed that the face toner formulation was able to moisturize due to the addition of glycerin, which is used as a humectant. A humectant itself is a material that can retain water in the preparation. Humectants can help improve the stability of a material.(Wahyuni et al., 2023).

Based on the analysis of the test results, the moisture content ranged from 3742.33 ± 2714.82 to 5555.33 ± 414.88. Formula 3 showed the highest moisture content of 5555.33 ± 414.88, while Formula 1 had the lowest value of 3742.33 ± 2714.82. Statistical analysis using the ANOVA test showed a p-value of 0.574 ($p > 0.05$), which means there was no statistically significant difference between the formulas in terms of moisture content. The highest moisture content in Formula 3 is likely influenced by the more optimal humectant content. However, because the difference is not significant, all formulas can be categorized as having a good and relatively balanced moisturizing effect. Formula 2 showed good and stable moisturizing ability, while maintaining a comfortable consistency when applied. This indicates that Formula 2 is able to provide an optimal hydration effect without sacrificing the physical properties of the preparation.

Based on the results of the post hoc test, the significance value for all formula pairs was above 0.05. This indicates that there was no significant difference in moisture content between formulas 0, 1, 2, and 3. All formulas had relatively uniform moisture content and were not statistically significantly different. This indicates that the base components of the preparation, such as humectants and emollients, play a dominant role in maintaining moisture, so variations in the concentration of active ingredients have no effect. These results are consistent with research by Putri et al., 2021, which states that differences in plant extract concentration in topical preparations do not always significantly change moisture levels, as long as the base formulation contains adequate humectants. The absence of significant differences in moisture content between formulas indicates that all formulas have good and consistent hydration, making them safe and effective for use as skin care products.

CONCLUSION

This study successfully developed a face toner preparation combining Moringa oleifera L. and Clitoria ternatea L. leaf infusion with three formulas of varying concentrations that met overall physical quality standards. All formulas showed a homogeneous liquid form, a stable mint aroma, attractive colors (white to light blue), a safe pH of 6.26-6.50, a low viscosity of 0.53-0.92 mPa.s, non-irritant, and an average increase in moisture of up to 50.81% after use, with F2 as the optimal formula

due to the balance of viscosity and hydration without significant differences between parameters ($p>0.05$ except viscosity). Phytochemical screening confirmed the presence of alkaloids, flavonoids, tannins, steroids, and saponins that support antioxidant and moisturizing potential.

However, limitations include the lack of long-term stability testing (>28 days), microbiological testing, and quantitative antioxidant activity (such as IC50 DPPH), as well as limited sample size with a small panel of panelists without a large clinical control group. Suggestions for further research include in vivo testing on diverse subjects, formulation with natural preservatives for improved shelf life, and evaluation of long-term efficacy against skin aging. Practically, this formula has implications as a safe natural skincare alternative for Indonesians, especially in tropical areas with high pollution, supporting a sustainable local plant-based cosmetics industry.

REFERENCES

Ainiyah, N. (2025). Formulation optimization and physical quality testing of toner preparations from lavender essential oil (Lavandula angustifolia L.). Scientific Journal of Pharmacy and Science, 367–377.

Arifah, EN, Prabandari, S., & Purgiyanti. (2024). Testing the physical properties of face toner preparations from butterfly pea flower (Clitoria ternatea L.) infusion extract. Scientific Journal of Pharmacy, 7(1), 101–109.

Asmarani, AP, Rahmatillah, A., & Artini, KS (2025). Antibacterial activity of face toner combining kenikir leaf extract and aloe vera extract against Propionibacterium acnes bacteria. Journal of Pharmacy, 9(2), 86–100.

Azizah, N., Putriana, A., Aliza, N., & Tugon, ADT (2024). Formulation and evaluation of toner preparations from job's tears seed extract (Coix lacryma-jobi L.) as an antioxidant. Journal of Pharmacy, 9(6), 577–595.

Cahyaningsih, E., Yuda, PESK, & Santoso, P. (2019). Phytochemical screening and antioxidant activity test of ethanol extract of butterfly pea flower (Clitoria ternatea L.) using UV-Vis spectrophotometry method. Jurnal Ilmiah Medicamento, 5(1).

Creswell, J. W., & Creswell, J. D. (2023). Research design: Qualitative, quantitative, and mixed methods approaches (6th ed.). SAGE Publications.

Emzir. (2024). Educational research methodology: Quantitative and qualitative. Rajawali Press.

Gobel, AA, Bahi, RR, & Mappa, MR (2025). Formula optimization and stability evaluation of facial toner preparations from keji beling leaf extract (Strobilanthes crispus L.). Journal of Pharmaceutical and Sciences, 8(4), 2219–2230.https://doi.org/10.36490/journal-jps.com.v8i4.902

Hasrizal, H., Putra, FA, & Y. (2025). Formulation and stability test of facial toner preparations made from papaya leaf extract. Jurnal Perspektif, 8(2), 187–199.https://doi.org/10.24036/perspektif.v8i2.1083

Kadarul, K., et al. (2023). Evaluation of physical stability of herbal topical preparations. Indonesian Journal of Pharmacy, 12(2), 45–53.

Ningsih, EW, Fitriawati, A., & Listyani, TA (2024). Formulation and physical quality testing of purified basil (Ocimum × africanum L.) leaf extract toner as an anti-Propionibacterium acnes ATCC 6919. Tembusai Health Journal, 5, 10571–10584.

Nurlitaningrum, A., Indrasari, T., & Endrawati, S. (2025). Formulation and stability test of moringa leaf extract toner (Moringa oleifera Lam.). Indonesian Journal of Pharmacy and Pharmaceutical Sciences, 14(2), 234–241.

Pratiwi, D., et al. (2021). The effect of variations in plant extract concentration on the physical characteristics of topical preparations. Journal of Pharmaceutical Science and Practice, 7(1), 15–22.

Putri, AFK, Ardiyanto, B., & Rahmatillah, A. (2025). Phytochemical screening of secondary metabolites of Moringa leaf and butterfly pea flower infusions. Proceedings of the National Health Information Seminar, 1, 11–16.

Putri, R., et al. (2021). The effect of formulation base on the effectiveness of herbal topical moisturizers. Indonesian Journal of Pharmaceutical Sciences, 19(2), 88–95.

Sugiyono. (2023). Quantitative, qualitative, and R&D research methods. Alfabeta.

Sudaryono. (2022). Research methodology: Quantitative, qualitative, and mixed methods. Rajawali Press.

Susanty, NA, Chaerrudin, A., & Yudistirani, SA (2019). Antioxidant activity of Moringa oleifera leaf extract as an additive in the manufacture of moisturizers. Journal of Pharmaceutical Science and Applied Pharmacy, 1, 1–7.

Wahyuni, W., Saputri, RK, & Hutahaen, TA (2023). Antioxidant test and effectiveness of red binahong leaf (Anredera cordifolia) extract toner preparation. Indonesian Journal of Health Science, 3(2a), 438–445.

Widayanti, R., & Husni, M. (2023). Decision support system for selecting skincare products that suit facial skin types using the weighted product method. Computational Scientific Journal, 22(2), 29–30.

Yusriyani. (2024). Preparation and physical quality testing of facial toner preparations made from starfruit (Averrhoa bilimbi L.) leaf infusion. Journal of Pharmacy and Health, 8(2), 146–152.