

FORMULATION OF *BODY LOTION PREPARATION* FROM EXTRACT BROWN SEAWEED ETHANOL (*Kappaphycus alvarezii*)

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A B S T R A C T

Background: This study is that brown seaweed (*Kappaphycus alvarezii*) is an algae species that contains bioactive compounds such as flavonoids, phenols, and vitamins, which have potential as a base ingredient in the formulation of cosmetic products. **The purpose of the study:** this is to develop a body lotion formulation based on brown seaweed ethanol extract and evaluate its physical characteristics. The extraction is carried out using the **method:** maceration with 96% ethanol solvent, and the *body lotion formulation* is prepared in three different concentrations of extracts, namely 5% (F1), 10% (F2), and 15% (F3). Formulation evaluation was carried out on the following parameters: organoleptic (color, odor, texture), pH, homogeneity, dispersibility, adhesion, stability, and irritation test. **Results:** the study showed that the entire formula met the organoleptic test criteria with good color, odor, and texture characteristics; pH was within the appropriate range for the skin (4.5-8.0); homogeneity showed satisfactory results; and adhesion to established standards. The formulation also shows good physical stability after going through 6 cycles of *Freeze and Thaw testing*, and does not cause an irritating reaction to the skin. pH evaluation showed that formulas F1, F2, and F3 met the established pH criteria, but formula F3 did not meet the dispersion test standards. **Conclusion:** Based on the results of the study, it can be concluded that brown seaweed extract can be formulated into a *stable and safe body lotion preparation* for use

INTRODUCTION

Indonesia is an archipelagic country with a very large sea area and rich in natural resources. One potential biological resource is seaweed, which has a variety of benefits for humans and marine ecosystems.(Maghfuroh, 2024). Flavonoids are secondary metabolite compounds that are naturally found in almost all types of plants. This compound belongs to the polyphenol group and has various pharmacological effects, including as an antioxidant, anti-aging, anti-inflammatory, antiviral, and a number of other biological activities (Aribowo, 2021).

Extraction is a method of separating or isolating certain components including solid and liquid materials Using solvent liquids is based on the difference in solubility between the solute and the solvent used.(Setiawan *et al.*, 2016). The extraction process of brown seaweed is carried out by the extraction method by soaking, which is one of the cold extraction techniques that aims to attract or dissolve all the chemical components of the elements contained in the sample (Nurwanti *et al.*, 2023). Data obtained The extraction process is in the form of extracts, which are thick preparations The active compounds are extracted from simplicia through the extraction process Vegetable or Animal applying the right solvent, then the solvent is completely or partially removed until obtained from the form of mass or powder, followed by the next processing stage in order to in accordance with the criteria Set (Saputra) *et al.*, 2022). Extraction is carried out with the intention to Obtain chemical compounds contained in natural sources. The basic principle is based on the process of transferring the mass of substances from materials into solvent liquids, which begins in the interface layer section continues with diffusion until dissolved on solvent solution. (Daun & Moringa, 2016).

Seaweed has high economic value and great opportunities to be developed as a raw material for various products, including cosmetic products. *Kappaphycus alvarezii* is one of the most widely used types of seaweed (Yanuarti *et al.*, 2017). The type of seaweed is classified as a type of macroalgae that

is widely found in coastal waters and is known to contain various bioactive compounds, including antibacterial, antioxidant, and immunostimulant properties.(Yanuarti *et al.*, 2021). Flavonoid compounds found in brown seaweed, which is the dominant group of phenolic components containing chromophore groups. Existence the chromophore unit plays a role in flavonoid capacity capturing light waves ultraviolet (UV).(Emphasis added) *et al.*, 2017). Ascorbic acid is a water-soluble vitamin that has a role in as a natural antioxidant in the human body, has a role in neutralizing free radicals (Sarni *et al.*, 2020). These macroalgae store Various Seaweed has benefits, including being a natural antioxidant provider. Based on their origin, antioxidants are divided into two types, namely natural antioxidants and synthetic antioxidants. The antioxidant content of seaweed plays an important role as a protection mechanism for the body from Harmful Effects of Reactive Radicals (Syafitri) *et al.*, 2022).

One of the skincare products is body lotion, Cosmetic preparations serve to maintain the softness, smoothness, and moisture of the skin. Body lotion formulations with the addition of gotu gotu extract need to be further researched to evaluate their potential antioxidant activity.(Nurrosyidah, 2020). Body lotion has several advantages, including being easy to apply evenly, can be applied practically, and works directly on the target tissue to produce the desired therapeutic effect (Maheswara *et al.*, 2025). The skin is the outermost organ that lines the structure of the human body and accounts for about 15% of the total body weight. On the surface of the skin there are pores that serve as channels for sweating (Kumarahadi *et al.*, 2020). The structure and function of the skin is divided into three main layers, namely: (1) epidermis, which serves as the body's outermost defense against the environment; (2) the dermis, which acts as the main place for the supporting components of the epidermis; and (3) hypodermis or subcutaneous, which is composed of fatty tissue and connective tissue rich in blood vessels and nerves (Scott, 2017).

Based on previous research, body lotion has been formulated as a preparation with free radical anti-inflammatory activity due to exposure to ultraviolet light. Therefore, in this study, researchers are interested in developing body lotion as a skin moisturizing preparation.

METHOD

Research Design

This research is a laboratory experimental research that aims to formulate a body lotion preparation from seaweed (*Kappaphycus alvarezii*) extract and conduct a physical stability test.

Research Time and Place

This research was carried out at the Pharmaceutical Laboratory of Baubau Polytechnic and Bina Husada Polytechnic in the period from May to July 2025.

Materials and Tools

The ingredients used include brown seaweed (*Kappaphycus alvarezii*) obtained from Laompo Village, South Buton, 96% ethanol, aquadest, stearic acid, cetyl alcohol, propylene glycol, glycerin, methyl paraben, propyl paraben, and cherry perfume. The tools used include analytical scales, measuring cups, porcelain cups, rotary evaporators, ovens, mixers, and laboratory glass equipment.

Preparation and Extraction

A total of 22 kg of fresh seaweed was washed, cut into small pieces, and dried until dried simplicia weighing 1773 g was obtained. Extraction is carried out by the maceration method using 96% ethanol, where the simplicia are soaked in 4 L of ethanol for 24 hours, then filtered and re-macerated for 48 hours. The filtrate obtained is combined, evaporated with a rotary evaporator, and continued to oven at 40°C until a thick extract weighing 3g with a yield of 0.17% is produced.

Body Lotion Formulation

The extract is formulated in three concentration variations, namely 5% (F1), 10% (F2), and 15% (F3). The additives used include stearic acid (5%), cetyl alcohol (1.5%), propylene glycol (5%), glycerin (10%), methyl paraben (0.02%), propyl paraben (0.18%), and one drop of perfume, with aquadest as solvent. The manufacturing process is carried out by heating the water phase and the oil phase separately, then mixing the two at the same temperature until homogeneous, followed by the addition of extracts and perfumes.

Formulation of brown seaweed body lotion (*Kappaphycus alvarezii*)

Body lotion containing brown seaweed ethanol extract is made in four formulas, namely F1, F2 and F3. The composition of each formula can be seen in the Table below.

Material	F1	F2	F3	Uses
Brown seaweed extract	5%	10%	15%	Active substances
Stearic acid	5%	5%	5%	Emulsifier
Acetyl alcohol	1,5%	1,5%	1,5%	Emulsifier
Propyl paraben	0,18%	0,18%	0,18%	Preservatives
Methyl Paraben	0,02%	0,02%	0,02%	Preservatives
Propylene glycol	5%	5%	5%	Hufixan
Glycerine	10%	10%	10%	Emollient
Perfume	1 drop	1 drop	1 drop	Aroma
Aquadest	Ad 10	Ad 10	Ad 10	Solvent

Information:

F1: Body Lotion formula with 5% brown seaweed extract concentration

F2: Formula body Lotion with 10% brown seaweed extract concentration

F3: Body Lotion formula with 15% brown seaweed extract concentration

Physical Evaluation

Organoleptic Examination

Body lotion analysis is carried out through visual observation that includes color, aroma, and shape of the preparation.

pH Test

pH measurements are carried out using universal indicators. Each body lotion formula with brown seaweed ethanol extract is first diluted using aquades, then a universal pH indicator is dipped in the preparation and left for a while until results show up. The pH value is read on the basis of the indicator scale, with the appropriate pH range for topical preparations being 4.5–8.0, corresponding to the normal pH of the skin.

Homogeneity Check

The homogeneity test on the preparation of brown seaweed ethanol extract body lotion was carried out by taking a small number of samples placed between two glass objects, then observed to assess the presence of coarse particles or inhomogeneity. Homogeneity is important to ensure that the active substances in the preparation are evenly distributed so that they can work optimally without causing irritation during use.

Dispersion Test

A total of 0.5 g of brown seaweed (*Kappaphycus alvarezii*) extract body lotion preparation is weighed and placed in the center of the petri dish. Next, another petri dish is placed on top of the sample and left for 1 minute, then the spread diameter is measured and recorded. After that, a weight of 200 g is added on top of a petri dish, let it sit for 1 minute, then the diameter of the spread is recorded again. The measurement results were compared with the ideal topical preparation spread requirement, which is 5–7 cm.

Adhesive Strength Test

A total of 0.1 g of brown seaweed (*Kappaphycus alvarezii*) extract body lotion preparation was weighed, then placed in the center of the object glass and covered with other object glass. Next, a load weighing 50 g is placed on the glass of the covering object for 5 minutes. After the load is released, the glass ends of the upper and lower objects are attached to the adhesion test device using clamps, then the load support is removed. The time it takes until the two glass objects are separated is recorded as the preparation adhesion time. The preparation is declared to meet the requirements if the adhesive time is not less than 4 seconds

Stability Check

The stability test was carried out by the Freeze and Thaw method on each formula of 2 grams which was put into six tightly closed vials. Three vials were used as controls and stored at 25°C, while the other three vials underwent a Freeze and Thaw cycle. In this cycle, the vials are stored at 4°C for 24 hours then transferred to room temperature ($\pm 25^\circ\text{C}$) for 24 hours, which counts as one cycle. The process is repeated for up to six cycles, with observations of organoleptic changes in each cycle. The preparation is declared stable if after six cycles there is no change in organoleptic characteristics.

Irritation Test

The skin irritation test is carried out by the open patch test method. The preparation is applied to the inner forearm area with a surface area of $\pm 2.5 \times 2.5$ cm, then left open to observe the reaction. Testing is carried out twice a day, namely in the morning and evening for three consecutive days. A positive

irritant reaction is characterized by the appearance of redness, itching, or swelling in the area of the skin being treated.

Data analysis

The data obtained during the study were adjusted to the requirements of the physical properties of brown seaweed (*Kappaphycus alvarezii*) body lotion preparations, which included the results of observations on organoleptic tests, pH tests, homogeneity tests, dispersion tests, adhesion tests, and stability tests.

RESULTS & DISCUSSION

Table 1. Results Presentation of brown seaweed extract soaking (*kappaphycus alvarezii*)

Sample weight	Weight of brown seaweed extract	Yield
1773 g	3 g	0,17%

Source: Primary Data, 2025

Extract yield is an important parameter to assess the efficiency of the extraction process. In this study, extraction was carried out by maceration method using ethanol solvent. The yield was calculated by comparing the weight of the condensed extract obtained with the initial weight of the dried simplicia used. The yield value of brown seaweed extract (*Kappaphycus alvarezii*) is shown in Table 1. The results of the calculation showed that from a wet sample weighing 22 kg, dry simplicia weighing 1,773 g was obtained, which after extraction produced a thick extract of 3 g with a yield of 0.17%.

Table 2. Organoleptic Results

Formula	Organoleptic results	Picture
I	Cream color, Sakura smell, soft lotion form, smooth without coarse particles and easy to apply.	
II	Yellowish cream color, cherry blossom smell, soft lotion form, smooth without coarse particles and easy to apply.	
III	Creamy brownish color, Sakura smell, soft lotion form, smooth without coarse particles and easy to apply.	

Source: Primary Data, 2025

Organoleptic tests are carried out to directly observe the shape, color and smell of the body lotion. The organoleptic test results of formulation 1 showed cream color, Sakura smell, soft lotion form, smooth without coarse particles and easy to apply, 2-color yellowish cream formulation, cherry smell, soft lotion form, smooth without coarse particles and easy to apply and 3-color formulation brownish cream, Sakura smell, soft lotion form, smooth without coarse particles and easy to apply. The results of the organoleptic test can be seen in Table 2.

Table 3. pH Test Results

Formula	Ph	Information
I	6	Qualify
II	6	Qualify
III	6	Qualify

Source: Primary Data, 2025

The pH test is one of the important parameters in the physical evaluation of body lotion preparations, as these preparations are applied directly to the skin. A pH that is too alkaline can cause the skin to become dry and scaly, while a pH that is too acidic can cause irritation. In this study, pH measurement was carried out using a pH meter. The test results listed in Table 3 show that the body lotion preparation of brown seaweed extract (*Kappaphycus alvarezii*) in Formula 1, Formula 2, and Formula 3 has a pH value of 6. This value is within the normal pH range of the skin, which is 4.5–8.0, so it can be declared to meet quality standards and safe for use on the skin.

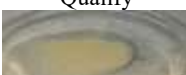
Table 4. Homogeneity Test Results

Formulation	homogeneity	Description/Images
I	Homogeneous	 Qualify
II	Homogeneous	 Qualify
III	Homogeneous	 Qualify

Source: Primary Data, 2025

Homogeneity tests are carried out to ensure whether or not there are coarse particles in the *body lotion* preparation. The results of tests on *brown seaweed* (*Kappaphycus alvarezii*) *extract body lotion* preparations show that Formula 1, Formula 2, and Formula 3 have a homogeneous texture because no coarse particles are found. This finding is in accordance with the requirements of good body lotion quality, which is that it does not contain coarse granules, so it can be concluded that the formulated body lotion preparations meet homogeneity standards.

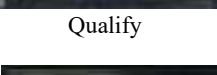
Table 5. Dispersion Test Results

Formula	Spreadability	Description/Images
I	5,3	 Qualify
II	5,35	 Qualify
III	4,3	 Not eligible

Source: Primary Data, 2025

A dispersion test is performed to assess the ability of the *body lotion* preparation to spread on the surface of the skin when used. Based on the test results shown in Table 5, it is known that Formula 1 has a dispersion of 5.3 cm, Formula 2 of 5.35 cm, while Formula 3 is only 4.3 cm. The dispersion range that meets the quality requirements of body lotion is 5–7 cm. Therefore, Formula 3 does not meet the requirements because it has a texture that is too dense, making it difficult to spread on the skin.

Table 6. Adhesion Test Results

Formula	Adhesion test	Description/Images
I	2,67	 Qualify
II	1,57	 Qualify
III	1,47	 Qualify

Source: Primary Data, 2025

Table 6 presents the results of the pre-test adhesion test, where Formula 1 has an adhesion value of 2.67 seconds, Formula 2 1.57 seconds, and Formula 3 1.47 seconds. Based on the requirements, a good body lotion preparation should have an adhesion of more than 4 seconds. Thus, the three formulas have not met the quality criteria set for the adhesion test.

Table 7. Stability Test Results

Formula	Stability test	Information
I	The results of stability testing on Formula 1 using the Freeze and Thaw method for 1 to 6 cycles showed that the body lotion of brown seaweed ethanol extract (<i>Kappaphycus alvarezii</i>) did not undergo phase separation and remained physically stable.	Qualify
II	The results of stability testing on Formula 2 using the Freeze and Thaw method for 1 to 6 cycles showed that the body lotion of brown seaweed ethanol extract (<i>Kappaphycus alvarezii</i>) did not undergo phase separation and remained physically stable.	Qualify
III	The results of stability testing on Formula 3 using the Freeze and Thaw method for 1 to 6 cycles showed that the body lotion of brown seaweed ethanol extract (<i>Kappaphycus alvarezii</i>) did not undergo phase separation and remained physically stable.	Qualify

Source: Primary Data, 2025

Stability testing, as shown in Table 7, was performed by storing 2 grams of *body lotion* in six tightly closed vials. Three vials were used as controls and stored at 25°C, while the other three vials were used for freeze and thaw cycle tests. In this test, the vial is stored at 4°C for 24 hours, then transferred to room temperature for 24 hours; The series is counted as a cycle. Testing is carried out up to six cycles with observation of organoleptic changes in each cycle. The results showed that the preparation remained stable because after six cycles there was no discoloration, separation, or other physical instability.

Table 8. Irritation Test Results

Formula	Irritation	Information
I	Non-irritating	Usual
II	Non-irritating	Usual
III	Non-irritating	Usual

Source: Primary Data, 2025

The results of the skin irritation test for formulation 1, formulation 2, and formulation 3 were carried out on three respondents, where each respondent tried all three formulas. The selection of the three respondents represented a variety of skin types, namely moist, sensitive, and dry skin. Based on the test results, the percentage of irritation caused was 0%, while the percentage of no irritation was 100%. This shows that the three *body lotion formulations* do not cause irritation to the skin. The results of the irritation test are presented in detail in Table 8.

Based on the results of the research that has been conducted, it can be concluded that brown seaweed (*Kappaphycus alvarezii*) obtained from Laompo Village, Batauga District, South Buton Regency, can be formulated into body lotion preparations with three concentrations, namely F I (5%), F II (10%), and F III (15%). Based on the test results which included organoleptic tests, homogeneity, pH, adhesion, stability, and irritation, all formulations met the evaluation requirements. However, formulation III did not meet the requirements on the dispersion test because the values obtained were below the set range.

COVER

Based on the results of the research that has been conducted, it can be concluded that brown seaweed extract (*Kappaphycus alvarezii*) can be formulated in the form of *body lotion* preparations. The results of physical evaluation of formulations F1, F2, and F3 showed that all three formulations met the requirements of organoleptic tests, homogeneity, pH, adhesion, stability, and irritation. However, in the dispersion test, the F3 formulation did not meet the set range of requirements.

This research has several limitations, including the inadequate availability of materials and equipment during the research process. Therefore, it is hoped that further research can be carried out with more complete means so that the results obtained can be more optimal and in-depth.

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