

FORMULATION AND PHYSICAL PROPERTIES TESTING OF A PREPARATION OF CARROT EXTRACT (*Daucus carota* L.) AS ANTI-AGING

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ABSTRACT

Background: Scrub cream is a cosmetic preparation used for skin care. The choice of ingredients significantly impacts the safety and effectiveness of the scrub. One natural ingredient that can be used in body scrub cream is carrot extract (*Daucus carota* L.). Carrots contain various secondary metabolites, including alkaloids, flavonoids, tannins, phenols, and terpenoids. Flavonoids and tannins are potent antioxidants that can prevent the harmful effects of UV rays and reduce skin damage caused by active compounds. This research aims to determine the physical properties of carrot extract scrub cream preparations with various extract concentrations.

Method: This research is experimental. Scrub cream formulations with carrot extract concentrations of 1%, 3%, and 5% were prepared. A negative control, which did not contain active substances, was used for comparison. The physical properties of each formula were tested, including organoleptic tests, homogeneity tests, pH tests, spreadability tests, and stability tests.

Results: The results indicated that scrub cream with a 1% carrot extract concentration met all the physical property test requirements for all replications. In contrast, the 3% carrot extract concentration in the third replication and the 5% carrot extract concentration in the first replication did not meet the requirements in the spreadability test.

Conclusion: From these results, it can be concluded that the body scrub cream formulas with 1% (Formula 1), 3% (Formula 2), and 5% (Formula 3) carrot extract meet all the physical property requirements for body scrubs, categorizing them as well.

Keywords: Formulation, Body Scrub Cream, Carrot Extract (*Daucus carota* L.)

INTRODUCTION

Cosmetics are materials or preparations intended for use on the outside of the human body or teeth and oral mucous membranes, especially to clean, perfume, and change the appearance, and/or improve body odor or protect or maintain the body in good condition. (BPOM RI, 2021). One treatment that can clean the skin deeply is by carrying out body care using a cosmetic body scrub. Scrub is a traditional cosmetic preparation that has long been used as a skincare product for generations (Isfianti, 2018).

Beta-carotene is useful for maintaining skin moisture, softening the skin, and preventing the appearance of wrinkles (Dewi & Wirahmi, 2019). Carrot flour contains

flavonoids as strong antioxidants and metal ion binders which are believed to be able to prevent the harmful effects of UV rays and reduce damage to the skin. Tannin is also an antioxidant that is able to protect against skin damage caused by free radicals due to exposure to UV rays and premature aging, so the content contained in carrots can be used as a skincare cosmetic and fight signs of premature aging (Siti & Megasari, 2019).

The use of white rice as a scrub ingredient has a chemical structure similar to ceramide which is able to influence the process of new cell regeneration and skin growth. Rice also provides a moisturizing effect, besides that it can also help increase collagen production which improves the skin and makes the skin bright and younger looking. The coarse

structure of rice is very suitable as a body scrub which can remove dead skin cells. One of the rice contains the compound gamma oryzanol which is useful as an antioxidant and is effective in warding off ultraviolet rays (Kusuma et al., 2023).

Extrinsic skin aging is mainly influenced by ultraviolet (UV) light and is also known as photoaging. The incidence of skin aging, especially photoaging, has increased over the last few decades. Although there is not much research on the incidence of skin aging, a study in Australia by Green stated that around 72% of men and 42% of women under the age of 30 experienced photoaging. Individuals who have a history of intensive sun exposure, live in areas that are geographically often exposed to sunlight and have light-colored skin have a higher risk of exposure to UV radiation and are therefore more susceptible to photoaging. Field workers such as farmers and fishermen have a higher risk of exposure to UV rays compared to office workers (Ahmad & Damayanti, 2018).

Based on research by Marlina (2023) regarding the antioxidant test of face mist preparations of carrot tuber extract (*Daucus carota* L.), it was stated that the antioxidant activity value of carrot tuber extract face mist (*Daucus carota* L.) at concentrations of 1%, 3% and 5% had IC₅₀ values respectively. also 41.31 ppm, 34.64 ppm, and 28.80 ppm, this value is in the very strong category. (Marlina et al., 2023). Based on research by Shufyani (2023) regarding a body scrub cream preparation made from carrot juice (*Daucus carota* L.) as anti-aging, said that the use of a body scrub cream containing carrot juice (*Daucus carota* L.) at a concentration of 15% for 4 weeks showed changes in skin condition to a greater degree. good with water content increasing 19.3 to 40 (107.25%), skin smoothness becoming smoother 36.3 to 20.6 (43.25%), pores getting smaller 64 to 20.6 (67.81 %), the number of blemishes has decreased by 51 to 11.3 (77.97%), the wrinkles have decreased on the respondents'

skin, showing that better results have been obtained, namely changes in wrinkles from 45 to 13.6 with a recovery percentage of (69.77%). (Shufyani et al., 2023).

Based on the above background, there are many benefits of the carrot plant for cosmetics, the researchers want to make a body scrub cream formulation from carrot extract (*Daucus carota* L.) with varying concentrations of 1%, 3%, and 5% which according to research by Marlina (2023) was carried out Antioxidant activity test, carrot extract concentrations of 1%, 3% and 5% in making face mist showed antioxidant activity results in the very strong category. In making the scrub cream formulation from carrot (*Daucus carota* L.) extract, organoleptic tests, homogeneity tests, pH tests, spreadability tests, and stability tests were carried out.

METHODS

This research uses experimental research methods. Carrot extract (*Daucus carota* L.) was made into a body scrub cream preparation with varying concentrations of carrot extract, then physical evaluation tests were carried out on the body scrub cream preparation including organoleptic tests, homogeneity tests, pH tests, spreadability tests, and stability tests of the preparations.

Research instruments and materials

Table 1. Scrub Cream Formula

Material	Concentration %			
	F0	F1	F2	F3
Carrot Extract (g)	0	1%	3%	5%
Stearic Acid (g)	12	12	12	12
Cetyl Alcohol (g)	0.5	0.5	0.5	0.5
Sorbitol (g)	5	5	5	5
Propylene glycol (g)	3	3	3	3
Triethanolamine (g)	1	1	1	1
Methyl Paraben	0.2	0.2	0.2	0.2
White rice (g)	2	2	2	2
Oleum rosae	4 drops	4 drops	4 drops	4 drops
Aquadest	ad 100 ml	ad 100 ml	ad 100 ml	ad 100 ml

The research instrument used were digital scales, beakers, measuring cups, mortar and pestle, evaporating dishes, water baths, glass slides, parchment paper, dropper pipettes, stir sticks, pH meter, filter paper, rotary evaporator, water bath, spatula, glass bottle, scrub cream pot ruler.

The ingredients used include carrot extract, stearic acid, cetyl alcohol, sorbitol, triethanolamine, propylene glycol, methylparaben, white rice scrub, distilled water, and oleum rosae.

Research procedure

To prepare the carrot extract, 6 kg of carrot tubers were cleaned, washed, and chopped. The chopped carrots were dried using sunlight and covered with a black cloth during the drying process. Once dried, the carrot tubers were ground into a fine powder. A total of 300 grams of this powdered carrot was soaked in 70% ethanol until fully submerged, with the soaking process lasting for 3x24 hours and stirring every 6 hours. The mixture was then filtered, and the filtrate was evaporated using a rotary evaporator and water bath until a thick extract was obtained (Pangamanan & Rabima, 2020).

For the preparation of white rice powder, 500 grams of white rice were thoroughly washed with running water to remove any dirt. The cleaned rice was then dried and ground into a powder. This powder was sifted using a 60-mesh sieve to obtain a fine white rice powder (Kusuma et al., 2021).

Making Scrub Cream Preparations

To prepare the scrub cream, first heat the mortar and pestle using hot water and then wipe them dry. Next, mix the oil phase ingredients, which include stearic acid and cetyl alcohol, in an evaporating cup and melt them in a water bath. Set this mixture aside, referring to it as mass I. For the water phase, dissolve sorbitol, propylene glycol, triethanolamine, and methylparaben using hot water in a glass beaker to form mass II.

Transfer mass I into the heated and dried mortar. Slowly add mass II to mass I with constant grinding. Gradually add the remaining water while grinding until a homogeneous cream mass is obtained. Incorporate the white rice scrub and carrot ethanol extract into the cream base according to the specified concentrations. Grind the mixture again, add 4 drops of oleum rosae,

and homogenize thoroughly. Finally, evaluate the scrub cream preparation for its physical properties (Shufyani et al., 2023).

Data analysis

To determine the evaluation of the physical properties of body scrub cream preparations, several tests were conducted based on the Indonesia Farmakope. These tests included organoleptic tests, pH tests, homogeneity tests, spreadability tests, and stability tests. The results of these evaluations are presented in table form according to the data obtained.

RESULTS AND DISCUSSION

1. Organoleptic Test

Organoleptic testing is used to determine whether the body scrub cream preparation that is made meets the desired criteria. The parameters assessed in this test include smell, color, and shape. Organoleptic tests are carried out using the five senses (Agata & Jayadi, 2022). The results obtained from the organoleptic test of the carrot extract scrub cream preparation can be seen in Table 2.

Table 2. Organoleptic Test Results of Carrot Extract Scrub Cream (*Daucus carota* L.)

Formulas	Parameter	Results
F0	Form	Semi Solid
	Smell	Typical Rose Aroma
	Color	White
F1 (1%)	Form	Semi Solid
	Smell	Typical Rose Aroma
	Color	Light Beige
F2 (3%)	Form	Semi Solid
	Smell	Typical Rose Aroma
	Color	Light Beige
F3 (5%)	Form	Semi Solid
	Smell	Typical Rose Aroma
	Color	Beige

Based on the examination, it shows that all formulas with the addition of carrot extract with concentrations of 1%, 3%, and 5% produce relatively the same physical form, namely semi-solid form, light cream to cream color and a distinctive odor of the fragrance added to the formula. The more carrot extract you add to each formula, the more intense the color will be, namely cream, the distinctive smell of the added fragrance, and the resulting

body scrub will become denser. The negative control without added carrot extract produces a white color, has a characteristic odor from the fragrance added to the formula, and is in semi-solid form.

2. Homogeneity Test

The homogeneity test is carried out to determine whether or not there are unmixed particles and the distribution of color on the surface and inside of the body scrub cream. Homogeneity was then confirmed again by smearing the sample on a glass plate (Kusuma et al., 2021). The results obtained from the Homogeneity test of the carrot extract scrub cream preparation can be seen in Table 3.

Table 3. Homogeneity Test Results for Carrot Extract Scrub Cream (*Daucus carota* L.)

Formulas	Check up result
F0	Homogeneous*
F1 (1%)	Homogeneous*
F2 (3%)	Homogeneous*
F3 (5%)	Homogeneous*

Scrub cream is declared homogeneous, indicating that there is no phase separation or particles that are not evenly distributed and the colors in the preparation are evenly mixed. The results of observing the homogeneity of the formula 1(1%), 2(3%), 3(5%), and the negative control scrub cream met the homogeneity requirements.

3. Test pH

pH measurements are carried out to determine the acidity level of the preparation being made. If a cosmetic product has a pH that is much different from the pH that the skin accepts, it will cause irritation and dry skin. The results obtained from the pH test of the carrot extract scrub cream preparation can be seen in Table 4.

Table 4. pH Test Results for Carrot Extract Scrub Cream (*Daucus carota* L.)

Formulas	Preparation	pH			Average
		1	2	3	
F0	1	6.3	6.3	6.3	6.3
	2	6.5	6.5	6.5	6.5
	3	6.4	6.4	6.4	6.4
F1 (1%)	1	6	6	6	6
	2	6.1	6.1	6.1	6.1
	3	6.1	6.1	6.1	6.1
F2 (3%)	1	6	6	6	6
	2	6.1	6.1	6.1	6.1
	3	6.4	6.4	6.4	6.4
F3 (5%)	1	6.2	6.2	6.2	6.2
	2	6	6	6	6
	3	5.8	5.8	5.8	5.8

The standard for scrub cream is based on the National Standardization Agency (1996), the appearance of a good scrub cream has a pH between 4.5-6.5. The pH test of the scrub cream preparation was replicated 3 times. The results of pH testing using a pH meter show value that are not much different and meet SNI requirements. The pH of all preparations obtained is not less than 4.5 and not more than 6.5 so that it will not cause skin irritation and make the skin dry when used. In this study, the negative control formula had a high pH compared to the formulas 1(1%), 2(3%), and 3(5%), so the addition of carrot extract could lower the pH in the body scrub cream preparation. Based on the pH test results, it was concluded that all body scrub cream preparations met the skin's pH requirements.

4. Spreadability Test

The spreadability test is carried out to ensure that the semi-solid preparation is able to spread easily without pressure so that it is easy to spread without causing pain when applied and to ensure user comfort. (Hakim et al., 2020).

Table 5. Test Results for Spreadability of Carrot Extract Scrub Cream (*Daucus carota* L.)

Formulas	Repetition	Spread Power	Average
F0	1	5.3*	5.33
	2	5.3*	
	3	5.5*	
F1(1%)	1	5.1*	5.32
	2	5.4*	
	3	5.4*	
F2(3%)	1	5.2*	5.14
	2	5.4*	
	3	4.8	
F3(5%)	1	4.7	5.07
	2	5.2*	
	3	5.3*	

The standard for scrub cream is based on the National Standardization Agency (1996), the appearance of a good scrub cream has a spreadability of between 5-7 cm. From the results of tests carried out using a load of 50 grams and adding 50 grams of weight every 1 minute, it show that the diameter of the spread of the scrub cream after being covered by the watch glass has an average of 4.7-5.4 cm, so based on the results of the spreadability test it can be said that it is only formula 2 (3%) and

formula 3(5%) there is 1 replication that does not meet the requirements.

In this study, increasing the extract concentration affected the resulting spreadability value. Because the higher the concentration value used, the denser the preparation, the viscosity of the preparation is higher so the spreading diameter is smaller, making it a little difficult for the preparation to spread.

5. Stability Test

An emulsion becomes unstable, one of which is caused by the clumping of the dispersed phase globules. Whether an emulsion preparation is damaged or not can be observed by changes in color and change in odor. To overcome material damage due to oxidation, you can add preservatives.

The results of observing the stability of the preparation by visually observing the phase separation, color, and odor at a temperature of 4°C hours and a temperature of 40 ± 2°C for 13 days.

Formulas	Observation for 12 days																	
	1			2			3			4			5			6		
	x	y	z	x	y	z	x	y	z	x	y	z	x	y	z	x	y	z
F0 (Negative Control)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F1 (1%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F2 (3%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F3 (5%)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Information :
 x = Color Change
 y = Change in Smell
 z = Phase Separation
 - = No change occurs
 + = Change occurred

Based on the results of the table, it can be seen that the cream preparation does not experience changes in color, odor, or separation in the emulsion phase. This shows that all body scrub cream preparations are stable in storage at 4°C and 40 ± 2°C for 13 days. Addition of 1 day of stability to replace the first cycle on June 4 2024 due to a power outage.

CONCLUSION

Based on research that has been carried out on the Physical Properties Test of Carrot Extract Scrub Cream (*Daucus carota* L.) with various extract concentrations, 1%, 3%, and

5% are requirements for the physical properties of the scrub cream.

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