

Compact Eyeshadow Preparations from Chicken Egg Shell and Rosella Flower Petals Extract (*Hibiscus Sabdariffa L*) as Natural Colorants and Preservativees

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Abstract

Eyeshadow adds dimension to the eyes, making them look attractive. However, the eyeshadow materials must be selected carefully to avoid side effects such as irritation or allergies on the eyelid skin. Eyeshadow can be made from natural ingredients. One natural ingredient that can replace talcum is chicken eggshell powder because it contains calcium, which can nourish the skin. Rosella flower petal powder extract is added as a natural colourant to produce this compact eyeshadow. Besides serving as a colourant, rosella flower petals contain anthocyanins and flavonoids, which have antioxidant and antibacterial properties. This study aims to explore the innovation process of utilizing chicken eggshell waste to create compact powder eyeshadow as a decorative cosmetic by analyzing the feasibility of the eyeshadow through organoleptic tests, pH tests, particle uniformity tests, specific gravity tests, and moisture content tests. The results of this study show that the physical quality of Formula III, with an extract concentration of 50%, is better physical quality than other concentrations because the resulting colour is light. However, the colour retention produced is the same as other formulas and does not last long.

Keywords: eyeshadow, egg shell, rosella, powder, natural

INTRODUCTION

Cosmetics with natural ingredients are becoming a modern trend in beauty. Most women prefer natural products over chemicals because they are safer to use and can minimize the side effects of chemicals. The use of cosmetics is an absolute necessity for women because of their awareness of looking beautiful and attractive, one of which is the use of eyeshadow. Eyeshadow is a cosmetic that gives a decorative impression to the eyes because it can give colour and the impression

of a shadow on the eyelids (Muto et al., 2019). Most eyeshadow products in circulation still contain the addition of rhodamine B, a synthetic dye that can be a carcinogenic substance. Eyelids have thin and sensitive skin, so the choice of eyeshadow materials needs to be considered to avoid side effects that can occur on the surface of the eyelids (Costa et al., 2019)

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avoid side effects such as irritation or allergies on the eyelid skin. Eyeshadow can be made from natural ingredients. One natural ingredient that can replace talcum is chicken eggshell powder because it contains calcium, which can nourish the skin. Rosella flower petal powder extract is added as a natural colourant to produce this compact eyeshadow. Besides serving as a colourant, rosella flower petals contain anthocyanins and flavonoids, which have antioxidant and antibacterial properties (Prasetyoputri et al., 2021).

Eyeshadow products use talcum as a filler (Fiume et al., 2015). One of the natural ingredients that can replace talcum chemicals is chicken eggshell powder. In recent years, most of the remaining eggshells from industrial waste have been disposed of in landfills, causing environmental pollution (Onwubu et al., 2019). Chicken eggshell waste contains 2% water and 98% dry matter. The shell of a chicken egg comprises 9-12% of the total weight of an egg, of which 94% is calcium carbonate. In addition, eggshells also contain fat, magnesium, phosphorus, potassium, and sodium. Eggshell calcium is the best natural source of calcium, and about 90% can be absorbed (Ray et al., 2017). Based on this, eggshell powder can be used as a substitute for talcum as a source of calcium that can nourish the skin.

Besides that, eyeshadow is a decorative cosmetic that requires colouring ingredients. Long-term use of synthetic dyes can cause skin problems. Therefore, researchers used rosella flowers (*Hibiscus sabdariffa* L.) as a natural dye. There are several main compounds in rosella petals, including citric acid, malic acid, anthocyanins, flavonoids and glycosides, and fibre (Izquierdo-Vega et al., 2020). Anthocyanin compounds in rosella can be used as an alternative to synthetic dyes into natural dyes. Rosella flower petals contain anthocyanins, a

compound that can provide natural pigmentation to purple. The presence of anthocyanins in rosella petals can also form flavonoids that act as antioxidants. So apart from being a natural dye, rosella petals also have the potential as a natural preservative because they contain antioxidants and antibacterials. Based on this background, adding rosella petals as a natural dye and preservative is expected to be of additional value in this eggshell eyeshadow research. Eyeshadow made from eggshells, combined with natural dyes from rosella flowers, can be an innovative decorative cosmetic that is environmentally friendly and has the potential to contain antioxidants that are good for the skin.

This study explores using chicken eggshell waste to create Compact Powder Eyeshadow. It analyzes the feasibility through organoleptic tests, pH tests, particle uniformity tests, specific gravity tests, and moisture content tests. The results show that Formula III, with a 50% extract concentration, has better physical quality and a lighter color than other concentrations. However, the color retention is similar to other formulas and does not last long.

METHOD

Materials

The materials used are dried red rosella flowers, chicken eggshells, aqua dest, magnesium carbonate, zinc stearate, titanium dioxide, gum, glycerin monostearate, and lanolin wax.

Preparation

Rosella Flower Petals Extraction.

Rosella flower petal powder undergoes an extraction process using Aquades solvent (Abou-Arab et al., 2011). For the extraction, 600 mL of distilled water and 100 g of rosella petal powder were used, with a ratio of 6:1 (Yuniati et al., 2021). The extraction method used is maceration in a dark room for 24 hours at 4 °C, followed by

filtering using filter paper (first extraction). The same treatment was repeated on the second to fourth dregs to find the best and most efficient extraction from rosella petals. The extract was then concentrated using a rotary evaporator at 45°C for 5 hours. The final extract can be stored in a container lined with aluminium foil at -18°C.

Eggshell Powder Making.

Eggshell samples were washed with water until clean, boiled for 15 min., and drained. The following process is drying at a temperature of 60°C for 2 h, then entering the dry egg shells to be mashed using a blender and sieved using a 100 mesh sieve (Novelina et al., 2020).

Eye Shadow-Making Procedure.

According to the specified formula, all materials such as zinc stearate, titanium dioxide, gum, and glycerin monostearate were weighed. The chemicals, except for isopropyl myristate and eggshell flour, were ground until homogeneous. Rosella extract and isopropyl myristate were also weighed, then mixed until a thick, homogeneous extract was obtained.

A hot mortar is used to mix the hot mortar preparation, rosella extract solution, and isopropyl myristate until homogeneous. The mixture is then placed in a container, dried, and covered with a glass box to protect it from dust and bacteria. The formula for the eggshell eyeshadow compact and rosella flower petal extract is shown in Table 1.

Several sample tests were conducted to evaluate eyeshadow preparations from eggshell powder and rosella flower petal extract to produce good physical quality.

1. Organoleptic Test. Eye shadow preparations were observed based on the shape, aroma, colour, texture, and pH produced.
2. Test pH. Test the pH using universal pH paper. pH paper is attached to the eyeshadow preparation to obtain a colour change. The colour that appears is matched to the colour of the pH indicator listed. A safe pH is in the pH interval of 4-7.
3. Homogeneity Test. The 500 mg eyeshadow preparation is placed on a slide, and another slide is placed on it to observe whether all the ingredients are homogeneous. An eyeshadow preparation can be considered homogeneous if no coarse grains are found.
4. Particle Uniformity Test. Before pressing, set aside 20 g of eyeshadow preparation and put it in sieve no. 100 for 20 min., then counted.
5. Specific Weight Test. Calculating the specific gravity by weighing the weight of the eyeshadow preparation in the form of paste and dry eyeshadow.
6. Effectiveness test. The effectiveness test carried out is the smear test. This test is carried out by applying the preparation to the skin on the back of the hand using an applicator and then observing the amount of colour attached. The smear test requires that the applicator can rub the preparation and is easily applied to the skin (Yayinlar, 2019)

Table 1. The formula for compact powder eyeshadow eggshell and rosella flower petal extract

Ingredient	Formula I	Formula II	Formula III	Function
Isopropyl myristate	0.30	0.30	0.30	Covering effect (matte)
Zinc Stearate	6.00	6.00	6.00	adhesive material
Titanium Dioxide	0.18	0.18	0.18	Preservative
Gom	0.02	0.02	0.02	fastener
Glycerin monostearate	20.00	20.00	20	Smooth
Eggshell flour	53.50	48.50	43.50	Filling material
Rosella flower petal extract	20.00	25.00	30.00	To colour as a dye

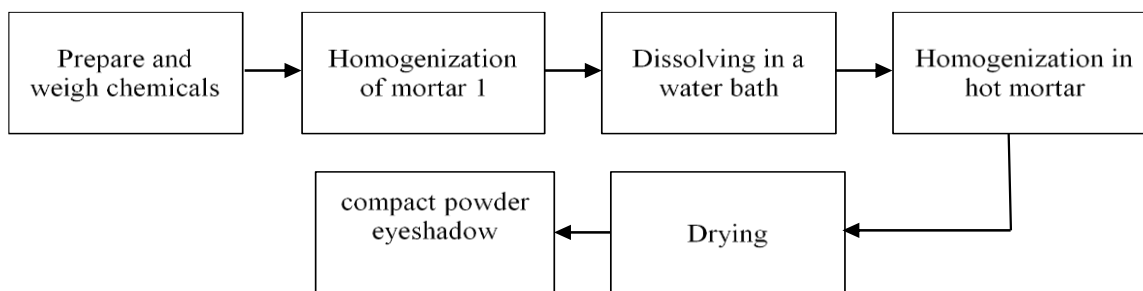


Figure 1. Flowchart for Making Eyeshadow

RESULT AND DISCUSSION

Organoleptic Test

The eyeshadow formulation produces a grey colour in Formula I, dusty pink in Formula II and purplish red in Formula III, as shown in Table 2. In terms of resistance, natural dyes from rosella flowers did not have good resistance for seven days of testing. On the second day, all formulations changed colour to become darker. It was due to anthocyanins being easily oxidized by light, so the preparation's colour is unstable (Enaru et al., 2021). The stability of anthocyanins is influenced by light, temperature, humidity, and pH, and anthocyanins are stable at pH 3.5. The observation results showed that the shape (texture) of the three eyeshadow formulas did not change after seven days of storage. Skin sensitivity testing is the target that ensures skin is amenable to and does not cause long-term damage in cosmetic safety evaluations (Setianingrum et al., 2013).

pH Test

pH testing is carried out using universal pH paper. The eyeshadow formulation produces pH values at FI, FII, and FIII, respectively pH 8.4 and 6. An organoleptic test requires a suitable pH for the skin (Almukainzi et al., 2022). An excellent cosmetic formulation has a pH interval of 4-7.

Homogeneity Test

The mixing of ingredients can be assessed by observing the colour of the preparation and the

absence of unmixed parts. The examination results of the mixture of eyeshadow ingredients have good homogeneity. The homogeneity test of the eggshell eyeshadow preparations with rosella flower extract concentrations of 20%, 25%, and 30% showed the same results: good colour and mix, and there were a few clumps. However, it was shown that all the ingredients and dyes were mixed. Examination of the preparation has good homogeneity, does not change, and there are no lumps (Contado et al., 2011).

Participle Uniformity Test

The results of the particle uniformity test in the eyeshadow preparation have yet to meet the requirements, namely 5.6% for both formulas I, II, and III, as shown in Table 3. The cause of the inappropriate test can be influenced by several factors, namely one of the ingredients in the formula that causes the preparation to clot. This clumping occurs because the chicken eggshell powder comprises 95.1% organic material, 3.3% protein, and water (Umar et al., 2021). While in research, the chicken eggshell powder contains calcium of 401 ± 7.2 grams or about 39% of calcium (Wong, 2016). Calcium carbonate itself is slightly soluble in water. Protein can also cause clumping due to coagulation and protein denaturation, which changes the nature of the protein to be difficult to dissolve in water (Yousefi & Abbasi, 2022). In addition, the sieving process is still done manually.

Table 2. The organoleptic of pasta eyeshadow preparations

Formula	Colour	Scent	Texture
I	Grey	Rosella special	Soft, sticky clot
II	dusty pink	Rosella special	Soft, sticky clot
III	Purplish red	Rosella special	Soft, sticky clot

Table 3. The particle uniformity test by sieve no. 100 for eyeshadow preparation

Formula	Sieve Remaining (%)	Sieve Results (%)	Average	Information
I	86.8	13.2	12.7	Not eligible
II	85.8	11.8	13.1	Not eligible
III	84.2	8.8	11.2	Not eligible

Table 4. Specific gravity test for eyeshadow for wet and Dry Weight

Formula	Wet weight	Dry weight
I	1.2	0.7
II	1.4	0.8
III	1.7	0.9

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Specific Weight Test

Skin sensitivity testing is essential to ensure that cosmetics are safe for the skin and do not cause long-term damage. The specific gravity test

results for formulas I, II, and III show different specific gravities, which can be attributed to the varying water content dissolved in each formula. All three formulas meet the specific gravity requirements, with average results of less than one, as shown in Table 4. This indicates that they are within acceptable safety standards. Additionally, continuous use of eye shadow products made with natural ingredients is generally safer compared to those contaminated with heavy metals. Products with heavy metals can gradually release harmful substances into the human body over time, posing long-term health risks (Ahmed et al., 2017). Therefore, using natural ingredients in eye shadows can reduce the potential for harmful effects on consumers.

Effectiveness Test

In the effectiveness test, all formulas were applied to the back of the hand using an applicator. The formula with a paste texture encountered difficulties in application, and the colors obtained from all three preparations were not very pigmented. The formulation of materials affects the amount and speed of absorption of

active substances and dyes, highlighting the need for careful consideration in the preparation process to ensure optimal effectiveness (Meineisasti et al., 2020).

CONCLUSION

Several key findings were obtained based on the research on the formulation of compact powder eyeshadow using chicken eggshell powder and rosella petal extract (*Hibiscus sabdariffa* L.) as natural colourants and preservatives. Formula III, with a 50% extract concentration, demonstrated good physical quality and lighter colour compared to other concentrations. All formulas (I, II, and III) showed good homogeneity with perfectly mixed materials and colours. However, the colour resistance in Formula III was similar to the others and did not last long. The particle uniformity test revealed that none of the formulas met the required standards, with a uniformity rate of 5.6% across all formulas. The specific gravity tests for all formulas (I, II, and III) met the requirements, averaging less than 1. The effectiveness test indicated that formulas with a paste texture were challenging to apply and the colors could have been more pigmented. Based on these findings, it is recommended to use the freeze-drying method on chicken eggshell powder and adjust the pH to match the desired colour from the rosella flower extract.

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