# Formulation of Solid Soap Combination of Green Tea Leaf (*Camellia sinnensis* L.) and Corn Kernel (*Zea mays*) Extracts

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**Abstract.** Soap is one of the daily needs used as a body cleansing agent. The variety of commercially available soaps is seen in the type, fragrance, color, and benefits offered. Corn kernels are rich in vitamin A and vitamin E, these vitamins act as natural antioxidants that can enhance the body's immunity and inhibit degenerative damage, the antioxidant content can prevent the aging process and counteract free radical. Green tea (*Camellia sinensis* L.) is one type of herbal plant, green tea contains polyphenols. The famous polyphenol is catechin. Catechins have antibacterial properties. This research used experimental research. The tests were carried out toward a foam-forming test, pH test, water content test, and preference test on 20 respondents. Statistical data analysis using ANOVA significance level of 5% for preference acceptance data using a DMRT significance level of 5%. Solid soap preparations from green tea extracts and corn kernels showed good quality in formulation F4: 25% corn and 75% green tea which have alkaline properties with levels pH 8.99, moisture content of 15.43.

**Keywords:** Solid soap, green tea, corn kernel

## 1. Introduction

Along with the times and technology, many innovations have emerged, especially in making soap. Soap is one of the daily necessities that can be used as a body cleansing agent. Solid soap is a product of oil derived from mixing sodium or potassium with fatty acids. In general, soap is in the form of solid or liquid, has foam and aroma that varies (SNI, 2016).

The principle of making solid soap in the form of dissolving the mass of soap in alcohol, then adding other additional ingredients that have certain functions. One of the uses of natural materials is green tea leaves because it is considered to be safer, more practical and economical and has fewer side effects than using chemicals.

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Free radicals are a form of reactive oxygen compound that has unpaired electrons so it tends to be unstable. These unpaired electrons will try to bind other electrons to become stable. Antioxidants are phytochemical compounds that act as electron donors to oxidant free radicals. Antioxidants are used as a deterrent to the oxidation process. The effects of free radicals on the body can cause damage to the function of body cells that cause degenerative diseases. The human body naturally produces antioxidants in the form of immune cells in limited quantities. To meet the needs of these antioxidants, external antioxidants are needed that can be obtained from vegetables and fruits. Examples of antioxidants that greatly affect the body's immune system are vitamin C, vitamin E, Se, Zn, and glutathione (Bewer, 2011)

Natural ingredients that can be used as antioxidants are green tea leaves (Camellia sinensis L) and corn (Zea Mays). Green tea leaves are known as plants that contain catechin compounds. Catechin compounds are known to be antioxidants that provide absorption at the wavelength of the UV B region (290-320) (Sari MP, 2014). Corn has Vitamin A or carotenoids and vitamin E, especially in yellow corn. In addition to its function as a micronutrient, the vitamin acts as a natural antioxidant that can increase body immunity and inhibit degenerative cell damage (Suarni, 2005)

## 2. Method

### 2.1 Material and equipment

The materials used in this study were green tea obtained from a yellow tea plantation, corn kernel from Karanganyar, 96% ethanol (Brataco), virgin coconut oil (VCO), ive oil, sodium hydroxide (NaOH) 30% solution, glycerin (Brataco), ethylendiaminamin tetraamide (EDTA), stearic acid, and deionized water.

The tools used in this study are glassware (Pyrex), blenders (Miyako), magnetic stirrer bars, vacuum pumps V-700, rotary vacuum evaporators (Buchi Rotavapor R11), stirrer hotplates (Thermo Fisher Scientific), analytical balance (Thermo Fisher Scientific, Ohaus), test tubes (Pyrex), pH meters (Risantec), waterbath, aluminum foil.

**The basic compositions of our solid soap were shown in below (Table 1).**

| Materials | Composition |
|---|---|
| NaOH 30% | 27 g |
| Aquadest | 70 mL |
| EDTA | 0.23 g |
| Olive oil | 10 mL |
| Palm oil | 130 g |
| Stearic acid | 10 g |

The basic composition of solid soap was called as *basis*. It was varied into 5 formulations (see Table 2).

**Table 2. Vary formulations of solid soap combination of green tea leaf and corn kernel extract**

| Materials | Ratio concentration of extract | | | | |
|---|---|---|---|---|---|
| | Formula | Formula | Formula | Formula | Formula |

| | 1 (F1) | 2 (F2) | 3 (F3) | 4 (F4) | 5 (F4) |
|---|---|---|---|---|---|
| Corn kernel extract | 1 | 2 | 1 | 1 | - |
| Green tea leaf extract | - | 1 | 1 | 2 | 1 |
| Aquadest | Add 100 | Add 100 | Add 100 | Add 100 | Add 100 |

All material used was weighed, the process of making soap utilized saponification reaction with the reaction of stearic acid, fatty acids with NaOH. Stearic acid was melted by heating 70ºC. Furthermore, palm oil and olive oil were mixed until homogeneous, then added 30% NaOH solution at a temperature of 60-70ºC, dissolved glycerin, added EDTA and extracts of green tea leaf and corn kernel.

**2.2 Extraction of green tea leaf and corn kernel**

The extraction method is carried out by infusion. Green weighed as much as 1 gram and 200 ml of distilled water is added, then the infusion process was carried out.

**2.3 Organoleptic test**

Organoleptic test was conducted toward physical tests of solid soap including colour, odour, and shape. Test was conducted on 20 respondents who were asked to try solid soap that was made in vary formulations, then after those respondents were asked to provide responses and assessments of transparent solid soap that had been tried.

**2.4 Foam forming test**

Foam forming was tested by weighting 1 g of solid soap. It was put into a test tube containing 10 mL of water. Furthermore, the test tube was shacked manually for 5 minutes then measuring the height of the foam.

**2.5 pH test**

pH test was conducted by 0.2 g solid soap soaked in 20 mL deionized water then the solution was measured using pH meter.

**2.6 Moisture content test**

The determination of moisture content was done by the gravimetric method. The procedures were weighing 5 grams of sample in a petri dish that was known the weight, heating in a drying cabinet at 105°C for 2 hours until the weight remains (SNI 01-3532-1994).

$$\text{Moisture content} = \frac{W1-W2}{W} \times 100\%$$

Information :

W = sample weight (grams)

W1 = container weight + soap (gram)

W2 = container weight + soap after heating (grams)

## 3. Results

### 3.1 Organoleptic test

Organoleptic testing aims to determine the physical appearance of solid soap preparations, by looking at the shape, odor, and color of the preparation. The resulting liquid soap is solid, brown and smelly.

### 3.2 Foam forming test

Foam is one of the most important parameters in determining the quality of cosmetic products, especially soaps. The purpose of foam testing is to see the foam strength from the soap. A stable foam for a long time is more desirable because foam can help cleanse the body (Pradipto, 2009). In this study, the high yield of foam was between 50.94-64.78%. The characteristics of soap foam are influenced by several factors, namely the presence of surfactants, foam stabilizers and other liquid soap compilers (Amin, 2006). Soap products on the market generally contain surfactants, namely Sodium Lauryl Sulfate (SLS) which functions as a foam enhancer. SLS is often used in soap making, but in large doses, it can irritate the skin. The making of soap in this study did not utilize Sodium Lauryl Sulfate (SLS) since it was expected to minimize the occurrence of skin irritation.

**Table 3. Foam content in solid soap**

| Formula | Foam content (%) |
|---|---|
| F1 | 50,94 [a] |
| F2 | 54,44 [a] |
| F3 | 64,78 [a] |
| F4 | 57,77 [a] |
| F5 | 58.56 [a] |

Information :

F1: 100% corn kernel; F2: 75% corn kernel and 25% green tea; F3: 50% corn kernel and 25% green tea; F4: 25% green tea and 50% corn kernel; 100%: green tea.

### 3.3 pH test

The measurement of pH in this study aimed for checking pH of the preparations that was affected by the irritating properties of the skin. The amount of alkali present in the soap affects the magnitude of the pH value. Making soap involves using large amounts of NaOH. Tests using a digital pH (meter) tool based on the analysis results, the solid soap obtained in this study has a pH range between 8.86-9.00. Whereas according to SNI, the pH range of solid soap ranges between 9-11. The solid soap obtained in this study has met the SNI standard. The soap in this researcher is alkaline because of the addition of corn kernels extract and green tea leaves containing alkaline compounds in solid soap preparations that affect the value of the

acidity (pH) produced. In this study, the best pH level was 9 in the F3 treatment with 50% corn and 25% green tea.

**Table 4. Result of pH test**

| Formula | pH |
|---|---|
| F1 | 8,86 [a] |
| F2 | 8,91 [a] |
| F3 | 9,00 [a] |
| F4 | 8,99 [a] |
| F5 | 8,91 [a] |

Information :
F1: 100% corn kernel; F2: 75% corn kernel and 25% green tea; F3: 50% corn kernel and 25% green tea; F4: 25% green tea and 50% corn kernel; 100%: green tea

### 3.4 Moisture content test

The water content test aims to determine the levels present in a solid soap preparation. Bath soap according to SNI 06-3532-1994 stipulates that the water content of bath soap has a limit of a maximum of 15%. In this study the water content of treatments F1, F2, F4, F5 meet the standard range of 15%, while the treatment F4 exceeds the standard of 16.74%. The amount of water added to the soap will affect the solubility of the soap. Moisture content in solid soap affects the quality of the preparation. Water added to soap products can affect the solubility of soap in water. According to Hambali (2005), the more water contained in soap, the soap will shrink easily and run out quickly when used. Based on the results of the test of water content obtained data.

**Table 5. Result of moisture content test**

| Formula | pH |
|---|---|
| F1 | 15,34[a] |
| F2 | 15,44 [a] |
| F3 | 16,74 [b] |
| F4 | 14,74 [a] |
| F5 | 15,43 [a] |

Information :

F1: 100% corn kernel; F2: 75% corn kernel and 25% green tea; F3: 50% corn kernel and 25% green tea; F4: 25% green tea and 50% corn kernel; 100%: green tea.

## 4. Conclusion

Solid soap preparations from green tea extracts and corn seeds have good quality in formulation F4: 25% corn and 75% green tea which have alkaline properties with pH levels of 8.99, moisture content of 15.43

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