Formulation and Evaluation of Secang Stem Extract (Caesalpinia Sappan L) in Decorative Cosmetics

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Abstract. Secang (Caesalpinia sappan L) is part of Caesalpiniaceae Familia. Orange to dark red color on skin of stem caused by brazilin in anthocyanin. Anthocyanins is a pigment that can be used in lipstick and replace lipstick dye which commonly used synthetic. This research is to formulate lipstick dye preparations using dyes from the bark of secang. The research is to formulate the lipstick dye using a color substance of Secang skin stem. Extract of Secang skin stem preparation made by the maceration method during 1x24 hour in room temperature using 70% ethanol solvent with a rotary evaporator to obtained viscous yield extract of 75%. Lipstick material is composed of carnauba wax, cera alba, cetyl alcohol, vaseline, oleum ricini, lanolin, propylene glycol, butyl hidroksitoluen, nipagin, and coloring from dye of Secang skin stem extract with a concentration of 14 %, 22 % and 30%. The test is covering, test of power smear, a test of homogeneity, point of melting test, pH test, strength and organoleptic test. The preparation of lipstick is providing the light red to dark red color who easily applied. The lipstick melting point is 64,2°C; 61,9°C and 60,6°C. The pH value is 5; 5,7 and 6,4. The stability of colors, shapes, and smells are stable. The development of lipstick dye manufacture with extracts of Secang skin stem can be used as a substitute for synthetic dye

1. Introduction
The Advancement of technology in modern era is increasing the needs of community in various fields and it is not an exception in the field of beauty. The field of beauty gives an answer for a woman need to appear beautiful, both for beauty care and cosmetology that able to transform the appearance becomes more beautiful instantaneously. It is commonly used by manufacturers of cosmetics to create the variety products of beauty, but not only utilized by the industry of beauty, but the education providers are trying to facilitate the learning for students to produce the product in accordance with the curriculum learning.

One of the education providers that facilitates students to produce beauty products is Cosmetics Program Study at Faculty of Engineering, Universitas Negeri Jakarta. Students of Cosmetology must follow the traditional cosmetics courses that require students to create a cosmetic. The learning achievement is that students have knowledge about traditional cosmetics and their benefits for face beauty, and students are also required to have the skills to make traditional cosmetics masks. Traditional cosmetics that are made, namely cosmetics from natural ingredients that have been investigated for their properties, have properties in beauty treatments.\(^{[1]}\)
Beauty is every woman's dream wherever she is. The coveted beauty for each woman varies depending on which angle the woman wants to say beautiful. One of the various steps to get value of beauty can be supported by a makeup.

Facial makeup is an effort to beautify face to be more beautiful and perfect through correction, the deficiencies on face such as black spots, scars, imperfect face shape can be covered by right and correct makeup by using corrective makeup that requires knowledge, accuracy, seriousness, patience and the provision of sufficient time to do it [2]. Facial make-up has many meanings because make-up has different goals for everyone. Facial makeup is a method that aims to beautify the face by highlighting beautiful parts, disguising or covering up the face deficiencies, giving the color art, with the right dose so in the end face will looks ideal and beautiful. In terms of makeup, it is required to use a variety of usage tools such as brushes, sponges, and cosmetics.

Cosmetics are subjects that need to be cared in everyday life. Materials or preparations that used on outside of the body, namely the epidermis, hair, nails, lips, teeth and oral cavity to cleanse, increase traction, improve body odor but not intended to treat an illness [3]. Products from various cosmetics, such as foundation, powder, solid powder, eyeshadow or eyelid coloring, eyebrow eyebrow, eyeliner, blush or cheek coloring, highlighter, and also lips dye or cosmetic lipstick.

Lipstick is a cosmetic preparation that used to coloring lips with an artistic touch so as to enhance the aesthetics of facial makeup. Lipstick preparations come in various forms, such as liquid, crayon, and cream [4]. The shape of the lipstick is influenced by the level and type of preparation contained in the lipstick. The quality of lipstick is determined by the lipstick fat base components [5]. Lipstick fat base is a formulation of ingredients that have different melting points that consisting of wax (wax), oil and fat. Lipstick preparation ingredients should come from natural materials which are more beneficial than synthetic materials because they have more tolerance to skin, so it not cause any severe irritation to the lips, therefore, it is necessary to find alternative materials that are safe to use for lipstick coloring preparations.

Dyes are a decisive factor in cosmetic preparations, especially in lipstick color preparations. These dyes can be made from natural dyes and synthetic or chemical dyes. The side effects of using lipstick from chemical dyes, for example from rhodamin are cause a concern. The use of rhodamin B in food and cosmetics for a long time will cause cancer and liver dysfunction. When exposed to large amounts of rhodamine B, in the short term there will be acute symptoms of rhodamin B poisoning [6]. Therefore, innovation of lipstick coloring with natural coloring preparations is needed. Back to nature natural dyes are increasingly needed because they are considered safer to reduce the risk of allergies compared to synthetic dyes. Synthetic dyes containing carcinogenic substances can cause a damage to liver [7]. All substances or ingredients in making lipstick must be ascertained materials that can indeed be used for the human body, for example dyes.

The use of natural dyes in lipstick preparation formulations is an effort to reduce allergic reactions from chemical dyes. Natural dyes can be obtained from plants, animals, or from mineral sources. Natural dyes have better biodegradability and generally have high compatibility with the environment. In addition, it is non-toxic, non-allergic to the skin, non-carcinogenic, easily available and renewable. Recently, the use of natural dyes has grown rapidly because the results of environmental analysis by many countries that synthetic dyes can cause allergic and toxic reactions. Therefore, various countries began to minimize these allergic reactions by using natural coloring preparations that available in surrounding environment either from processed minerals, fauna and flora. Many florals from Indonesia can be used as natural dyes, such as Secang Wood (Caesalpinia Sappan L,)
Secang Wood (Caesalpinia sappan L.) is a plant that lives grows wild in an area with a height up to 1,000 m DPL. Secang wood contains tannins, galat acid, resins, D-Alpha Phellandrene, oscimene, essential oils, resorsin and Brazillin. Brazillin is a group of compounds that give red color to Secang wood. The compounds in these brazillin have antioxidants and high anthocyanins which are good for natural dye preparations.

Therefore, the purpose of research is to utilize Secang Wood (Caesalpinia sappan L.) as a natural dye substance in the formulated lipstick preparation and determine the quality of the resulting lipstick preparation will effective in reducing the risk of allergies from the impact of the use of lipstick with chemical or synthetic dyes. The purpose of this research is to produce lipstick products from natural dyes from the stem bark extracts that are beneficial in the field of knowledge.

Cosmetics are ingredients or preparations that intended to be used on the outside of the human body, such as epidermis, hair, nails, lips, and outer genital organs, or the teeth and mucous membranes of the mouth, especially for cleansing, rearing, altering appearance, and/or repairing body odor or protecting or maintaining the body in good condition [8].

Lipstick is a cosmetic preparation that used to coloring lips with an artistic touch, to enhance the aesthetic in makeup that is packed in the form of solid stems. The fact of its function is to increase color of lips become red, which is considered to give a healthy and attractive facial expression [9]. Dye stuffs are additional ingredients that serve to give a certain tone or colour tone, commonly added to decorative cosmetic products, it holds a major role in each function of decorative cosmetics [10].

Extract is a concentrated preparation that obtained through extracting the active substances from flora simplisia or animal simplisia using the appropriate solvent, then all or almost all of the solvent is evaporated and the remaining mass or powder is treated in such a way that it meets the preset standards [11]. Extraction is the separation of active goods as a medicine or tissue of plants or animals using a suitable solvent through a prescribed procedure, during the extraction process, the solvent will be diffused to the dense material of the plant and will dissolve the compound with polarity in accordance with the prohibition [12].

Phytochemical test indicates that the secang steem contains chemical compounds from the alkaloid group, flavonoids, and saponin, the phytochemical compounds that act as antioxidants in the Secang steem are brazillins and flavonoids [13]. The Brazillin content that can produce an orange color to a dark red on the skin of the secang stem.

2. **Research Methodology**

The method is research and development. Research includes sample preparation, extract making, preparation formulation preparation, preparation evaluation examination. Tools used for the manufacture of lipsticks based on natural dyes of a Secang Steem bark extract are analytical scales, rotary evaporator, electric stove, refrigerator, pH meter, thermometers, Waterbath, stainless steel Waskom, porcelain mortar, plastic bottles, glass beaker, measuring cup, spoon takar, mortar, mixing glass, lab coat, mask, hand glove, etc. Ingredients for the preparation of a a Secang Steem bark lipstick are cera Alba, carnauba wax, propylene glycol, nipagin, cetyil alcohol, oil ricini, Vacelin, BHT, and the a Secang Steem bark extract. Collection of raw materials of fresh plant from Secang Stem Bark (Caesalpinia sappan L.) Then processed into Secang Stem Simplisia powder that obtained from the Balai Tanaman Obat. The beginning of the manufacture of the Secang Simplisia Powder is cleaned from the sticked impurities (sorting wet) then washed with flows clean water until it clean then drained to remove water waste from washes. A clean Secang Stem is then aerated and continued with the drying process with oven at a temperature of 40-50 °C to dry, after that do a dry sorting to clean secang
stem from the dirt that may still stick or not disappear while washing. The dried Simplisia then grinded to a powder Simplisia then it sifted with 40 mesh sieves.

**Extraction**
Simplisia powder weighed approximately 250 grams. Extraction is done by maceration using the ethanol solvent 70% as many as 2.5 liters and 3% citric acid for 1x24 hours while stirring sometimes, then Maserat filtered until we received a liquid extract. After that it thickened using a vacuum rotary evaporator tool with a temperature of 78° C until it is resulting in 75% of the secang stem bark extract yield obtained

**Lipstick Preparation**
The composition of the basic formula used refers to the lipstick formula Adliani,N[14] Modified with the preparation of lipstick dyes variations addition of Secang stem bark extract.

| Tabel 1. Lipstick Preparation Formula with Secang stem bark extract in various concentrate. |
|-----------------------------------------------|------------------|-----------------|-----------------|
| Composition                              | Formula (%)     | F1   | F2   | F3   |
| Cera alba                                 | 31,2            | 27,05|     | 25,21|
| Lanolin                                   | 6,12            | 6    | 5,06 |
| Vaseline                                  | 27,39           | 25,5 | 22,45|
| Setil alcohol                             | 3,71            | 4,5  | 4,13 |
| Carnauba wax                              | 4,76            | 3,75 | 3,44 |
| Oleum ricini                              | 7,62            | 6    | 5,51 |
| Ekstrak secang                            | 14              | 22   | 30   |
| Propilen glikol                           | 5               | 5    | 5    |
| Butil Hidroksi Toluen                     | 0,01            | 0,01 | 0,01 |
| Nipagin                                   | 0,01            | 0,01 | 0,01 |

Source: Adliani, N 2012

Preparation I : Formula with Secang stem bark extract 14%
Preparation II: Formula with Secang stem bark extract 22%
Preparation III: Formula with Secang stem bark extract 30%

**Figure 1. Weighing process**
Nipagin is dissolved into the propylene glycol, and the Extrak bark of the bar is jointly dissolved into Oleum Ricini. The mixture between the nipagin and propylene glycol is inserted into a Secang stem bark extract mixture and then stirred until homogeneous (mixture A). Lanolin, Vaseline Album and cetyl alcohol were inserted into the glass and then melted on a waterbath at a temperature of 60 – 65 °C (mixture B). After that mixture A inserted into mixture B, then stirring in the hot condition (above Waterbath). Once the mixture looks homogeneous, immediately inserted into the lipstick mold before it harden.

Figure 2. Initial mixing of the main ingredient of lipstick with dye Yet homogeneous

Figure 3. Lipstick preparations have been homogeneous after stirring

Figure 4. Lipstick Sample

Evaluasi Basis Lipstik
**Strength Test**
The preparation of the lipstick is placed in a horizontal position with approximately 1/2 inches from the edges of the lipstick, then given a load that serves as a weight. Load weight is added gradually with a specific value of 10 g each time interval of 30 seconds. Weight where a broken lipstick is a breaking point value [15].

**Homogeneity Test**
Homogeneity test to 3 types of lipstick is done by placing a total of 0.5 grams of each lipstick onto the object glass surface and then spread by using another object glass with a certain pressure [16].

**pH Test**
PH determination using the pH meter tool. The appliance was first calibrated using a neutral standard solution (pH 7.01) and a solution of the acid pH (pH 4.01) until the appliance showed the value of the pH. Then the electrode is washed with the aquadest and dried with tissue. The sample is made in 1% concentration of 1g of preparation and dissolved in 100 ml of aquadest. Then electrode dipped in the solution. Left tool shows the pH price up to constant. The indicated number of pH meters is the pH of lipstick preparations [16].

**Melting/Melting point test**
0.5 grams of each lipstick test (F1, F2, and F3) are placed in the watch glass then inserted into the oven with temperature of 50 °C, it is allowed then be observed whether the lipstick has begun to melt. After that the temperature was raised 1 °c and observed at temperature the lipstick began to melt [16].

**Spread Test**
The spread is determined by applying lipstick to the arm as much as 10 times then observed the color of the lipstick attached to the arm. Lipstick preparations is said to have the power of spread if the color stuck to the arm skin with much and uneven [16].

Analysis of data on the examination of homogeneity, spread, and stability is performed visually by observing the preparation directly. For the analysis of Melting point, pH, and hardness data using the test one way ANOVA. Before the test one way Anova started with a test of homogeneity. If the data distribution is normal and homogeneous then the one way ANOVA test can be done and the data analysis is followed by a hoc post test, the HSD Tukey test. This HSD Tukey test aims to know in detail each of the differences between controls and treatment. When the test of homogeneity is not distributed normal and homogeneous then perform the transformation of data. If data transformation succeeds then ANOVA one way test can be continued. However, if it fails then it is followed by non-parametric testing.

3. **Result and Discussion**
From the research that has been done, lipstick with F1 concentrations of Secang stem bark extract 14% is pink, F2 dyes Secang stem bark extract 22% is red, and F3 Secang stem bark extract 30% is dark red.
Figure 5. The result of lipstick from a Secang stem bark extract, Extrak concentrations of F3 (30%), F2 (22%), and F1 (14%).

**Organoleptical test**
The results of Organoleptis observation on lipstick formulas can be seen in table 2.

| Parameter       | Formula I     | Formula II    | Formula III   |
|-----------------|---------------|---------------|---------------|
| Color           | Pink          | Red           | Dark Red / Bricks Red |
| Odor            | Odorless      | Odorless      | Odorless      |
| Texture         | Solid and Shiny | Solid and Shiny | Less Solid and Not Shiny |

From the results of organoleptical examination of the three lipstick formulas, obtained the same smell from the preparation of lipstick. While the texture and color of the lipstick differ. This suggests that there is a change in the concentration of ingredient content and the dye extract of Secang affects the luster and color of the lipstick preparations. The higher the amount of dye concentration of secang dyes, more concentrated the color of the lipstes (can be seen in table 2).

**Lipstick Melting Test**
The result of a melting point test on the three lipstick formulas of the Seang stem bark extract can be seen in table 3. This indicates that the entire lipstick formula meets the requirements of the lipstick melting point, which ranges from 50 – 700°C, according to SNI 16-4769-1998.

| Formula | Melting Point Average |
|---------|-----------------------|
| F1      | 64.2°C                |
| F2      | 61.9°C                |
| F3      | 60.6°C                |

**Lipstick Hardness Test**
F1, F2, and F3 formula lipstick preparations have a broken range of hardness when added a load of 108-124 gram. The difference in hardness value of the lipstick that is caused by a variety of concentration comparisons is added to the lipstick mixture.


**Homogeneity Test**

Based on Lipstick Preparation homogeneity test from formula F1, F2, and F3 indicates that the preparation has a homogeneous arrangement. This indicates no influence of the comparison from various concentrations of the lipstick homogeneous preparation that looks not homogenized, such as crystals or uneven colors.

**Spread Test**

A Spread power test examination of the lipstick shows that the lipstick preparation of the Secang stem bark extract has good polish power. Because at the time applied on the back of the hand, the texture and color are good by using natural dyes from the Secang extracts of a it can stick well to the hand back skin. From this spread test, the resulting of intencity color can be seen. For F1, dye secang stem bark extract with 14% color showed pink, then for F2 with dye secang stem bark extract of 22% showed red color, and F3 dye form secang stem bark extract 30% showed the color of dark red lipstick. This shows that the greater the concentration given from secang stem bark extract will increase the sensitivity of the lipstick is inflicted or visible.

**Stability Test**

The result of the preparation stability check shows that as long as the 28-day storage is stable. The Aroma is odorless. For the color of the F1 keep it pink, F2 stays red, and for the F3 remains a dark red.

4. **Conclusion and limitation**

Based on this research can be withdrawn various conclusions that are influenced by various concentrations of lipstick preparations, especially in the preparation of lipstick dyes, namely those derived from natural dyes such as Secang stem bark extracts. Variations in the concentration of lipstick preparations produce a difference in color intensity as well as diverse textures. Broadly, it can be seen on the following chart:

![Figure 6. Various lipstick preparations test results](image)

Based on the table above, it describes a graph covering three aspects: Ph test, melting point test, and hardness test based on all three formulas. The pH in F1, F2, and F3 is seen to
increase. But the Picture graph is decreasing, visible at the level of melting point and strength. Broadly show, the larger the number of dyes for the stem bark extract used, the more the preparation of soft lipsticks but still in good levels because it is balanced with the dosage of various candles.

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