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Formulation process making of *Aloe vera* mask with variable percentage of *Aloe vera* gel extract

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Abstract. The purpose of this research is to get the effect of adding *Aloe vera* extract to mask formulation and get the best mask formula. The *Aloe vera* mask formulation is done with the amount of *Aloe vera* extract added. The mask composition consists of Polyvinyl Piroolidon K 30 (7.55%), Polyvinyl alcohol (1.51%), Methyl Paraben (0.10%), Propyl Paraben (0.10%), BHT (0.12%) and Water (90.61%). The amount of *Aloe vera* extract added as much as 5%, 10%, 15% and 20%. The properties of the mask tested include density, pH, vitamin C content, drying time and favorite test. The conclusions of this research were the effect of the addition of *Aloe vera* extract to the density, pH, vitamin C and drying time. The best content was 0.15%, 1.066 g / ml density, vitamin C 2.2 gram, pH 6.47, Drying time 25 minutes and viscosity 24,000 CP. In a favorite test with odor criteria, a soft feeling on the face, a clean feel on the face and color done on 20 panelists found the most preferred is a mask with 0.15% *Aloe vera* extract content.

1. Introduction

The *Aloe vera* plant is included in the *liliaceae* family. Distribution areas cover the whole world. *Aloe vera* itself has more than 350 types of plants [1]. The most widely developed species in Asia, including Indonesia, are *Aloe Chinensis Baker*, originally from China. This species in Indonesia has been grown commercially in West Kalimantan and is better known as *Aloe vera Pontianak* [2]. *Aloe vera* is used in the cosmetic, food, and pharmaceutical industries. In the cosmetic and toilet industry, it is used as a base material for mask, skin moisturizers, soaps, shampoos, sun lotions, make up creams, perfumes, shaving creams, bath aids, and many other products [3]. Determination of phenolic constituents of *Aloe vera* such as Aloin A and B, Aloenin (B), Aloesin and Chrysophanol [4].

Aloe vera fluid contain the main elements of aloin, emodin, gum and other elements such as essential oils. Aloin is an active ingredient that is antiseptic and antibiotic [5]. Carbohydrates in *Aloe vera* gel consist of three components: 16.2% of the liquid contains mannan, 0.7% microparticles containing polysaccharides (rich in galactose), and 83.1% of cell walls containing galactonic acid [6]. Polysaccharides isolated from *Aloe vera* with alcohol, composed of mannose: glucose: galactose: galactose A: fructose: arabinose: silosa with a ratio of 120: 9: 6: 3: 2: 2: 1. The active components of polysaccharides, and barbaloin of the *aloe vera* gel have maximum stability at 70 °C and a decrease in stability at a temperature higher or lower than the normal temperature. Barbaloin is an unstable component when dissolved in methanol, and undergoes transformation into a series of unidentified components [7].



APS 1 is a polysaccharide isolated from *Aloe vera*. APS 1 is composed of manosa and glucose (ratio 18: 5) with a molecular weight of about 2.1×10^5 . Testing of APS 1 shows that APS 1 can be an antioxidant active ingredient for the prevention and treatment of health problems associated with free radicals, such as coronary heart disease [8]. *Aloe vera* can support the immune system. Amino acids serve as a builder of cell and tissue cells, so that *Aloe vera* is good in helping the regeneration of new cells. Vitamin C, vitamin E and zinc (Zn) serves as a natural antioxidant [9].

Aloe vera has unique uses. *Aloe vera* polysaccharide component is responsible for penetration and lubrication ability. Enzymes are useful in the processing of nutrients in food. Protein is useful for repairing body tissues. As a cosmetic, *Aloe vera* is excellent in maintaining moisture, tightening and smoothing the skin. Pulp and yellow fluid fraction from aloe leaves efficacious as antifungal. Both materials may inhibit the growth of pathogenic fungi *F. oxysporum*, *R. solani*, *C. [10]*.

Masks are cosmetic preparations for facial skin care. Masks are applied to the facial skin in relatively thick layers and removed some time later, usually 15-30 minutes [11]. This type of cosmetics works to maintain healthy skin including cleaning, moisture protection, protection from UV hazards, antioxidants, whitening, prevent skin aging, prevent wrinkles, prevent lax and acne on the skin. In the formulation of a gel-peel off face mask type, the composition of the ingredients used is gelling agent, viscosity enhancing agent, and humectant will affect the physical and chemical properties of the peel off gel face mask.

The commonly used film coating polymers are polyvinyl alcohol (PVA) and polyvinyl pyrrolidone (PVP). The film layer is formed by the hydration process of the solvent component and the polymer chain which then coalesces into a film coating when it dries. In the gel peel offset formulation the viscosity-enhancing agent that can be used is HPMC, carbomer, gom, guar and CMC Na. Humectant serves to maintain stability by absorbing moisture from the environment and reducing water evaporation from the preparation. In addition to maintaining the stability of dosage, humectan indirectly also can maintain skin moisture so that the skin is not dry. The most commonly used types of humectants are glycerine, propylene glycol, and sorbitol [12].

Based on the content of these chemical compounds, the diversification of *Aloe vera* products is very broad, among others, required for cosmetic ingredients. Even *Aloe vera* commodity is also called as a plant of a million benefits. These factors cause *Aloe vera* products have opportunities and prospects of global marketing and very promising in the future. *Aloe vera* contains various substances in the leaves such as vitamins, minerals, enzymes and amino acids. The various substances that cause *Aloe vera* can be utilized in various fields such as cosmetics, pharmaceutical and food industries [13]. Amino acids and their properties and concentrations in the gel conditions vary depending on the conditions of storing aloe leaves in dark places or exposed to light. Given the quinone and anthraquinone contained in it, the presence of light will cause reddish changes in the gel eventually form a brown to brown color. Therefore, since light or heat is the catalyst for the reaction, the best way to avoid this color change is to store in dark, cold and dry places [14].

Efficacy of *Aloe vera* is quite diverse, such as antibiotics, antiseptic, antibacterial, antiviral, antifungal, anti-infection, anti-inflammatory and anti-swelling. *Aloe vera* can inhibit the growth of skin disease-causing organisms. In the invitro test, it is known that *Aloe vera* can inhibit the growth of *Dermatophilus congolensis*. In the presence of such capabilities, *Aloe vera* may be used as a cosmetic for the treatment and skin care. *Aloe vera* gel is able to hold skin moisture so as not easy to dry, this is because the lignin level can penetrate and seep into the skin, and hold too much fluid loss. The gel also contains 30% crystal aloin ingredients, consisting of barbaloin and isobarbaloin, resin, aloe emodin and amarphousaloin that stimulate hair growth [15]. *Aloe vera* works by combining several mechanisms. The gel, which consists mainly of polysaccharides, plays a role in blocking moisture. *Aloe vera* gel contains a variety of antibiotics and anti-fungi that have the potential to slow or block the disease-causing microorganisms [14].

Mask is one type of facial skin care used to improve the level of hygiene, healthy and beauty of the skin and improve and stimulate the return of dead cell activity. Masks include depth cleansing cosmetics because they can lift dead horn cells. The use of masks is usually done after the massage,

applied to the entire face except the eyebrows, eyes, lips so it will appear to wear a facial mask. In general, this mask aims to refresh, tighten the skin and as an anti-oxidant. Currently a natural face mask is often used as an alternative choice because it has no risk or harmful side effects [12]. The purpose of this research is to get the effect of adding *Aloe vera* extract to mask formulation and get the best mask formula. Masks are cosmetic preparations for facial skin care. Masks applied to the skin in the form of layers and removed in some time later usually 15-30 minutes.

2. Experimental method

The research was conducted at Applied Chemistry Laboratory, Chemical Engineering Department, Faculty of Engineering, Universitas Muhammadiyah Jakarta. The *Aloe vera* mask formulation is done with the amount of *Aloe vera* extract added. The mask composition consists of Polyvinyl Piroolidon K 30 (7.55%), Polyvinyl alcohol (1.51%), Methyl Paraben (0.10%), Propyl Paraben (0.10%), BHT (0.12%) and Water (90.61%). Mask Base Making All materials are weighed, Polyvinyl alcohol 72000 coupled with distilled water six times and then heated in a cup, stirred until the color is clear and homogeneous. Polyvinyl Piroolidon K30 is stirred in the mortar with the addition of a small amount of distilled water. The two masses are mixed and added propylenglycol, stirred until homogeneous. Methylparaben and propylparaben are added and stirred until homogeneous. The mask preparation mixes *Aloe vera* gel extracts in the base of the stirring mask until homogeny. The total of *Aloe vera* extract added as much as 5%, 10%, 15% and 20%. Mask properties tested include density, pH, vitamin C content, drying time and favorite test. On a favorite test with odor criteria, a gentle feeling on the face, a clean feel on the face and colors done on 20 panelists.

3. Results and discussion

This section presents and discuss the experimental results.

3.1. Effect of comparison of *Aloe vera* extract on vitamin C content

In the amount of *Aloe vera* extract added to the mask formula, vitamin C in the mask increased to 15 grams in 100 grams of mask formula (15% w / w) and decreased at 20% w / w. This can be seen in figure 1.

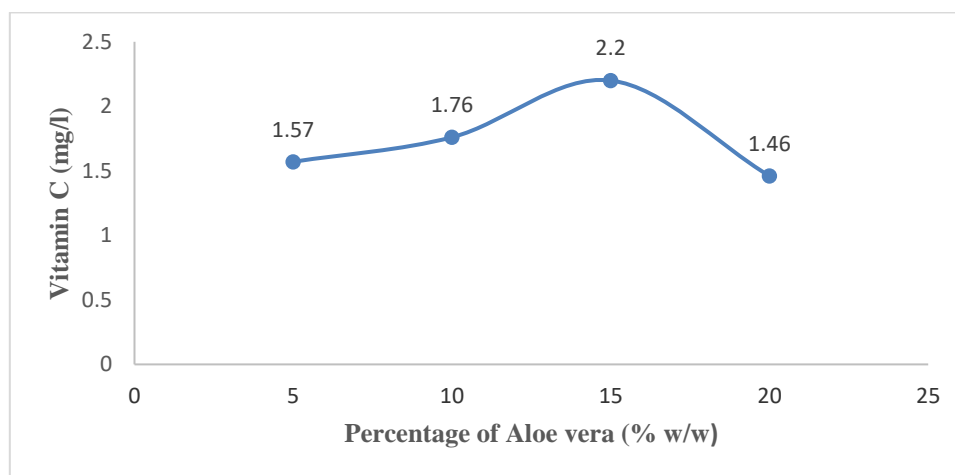


Figure 1. Effect of *Aloe vera* extract on vitamin C mask content.

Vitamin C in the 5% mask formula showed vitamin C 1.57 mg / liter, for 10% vitamin C 1.76 mg / litre, at 15% vitamin C 2,2 mg / liter and at 20% vitamin C decreased at 1, 46 mg / liter. High vitamin C is needed in the mask to give the effect of brightening and cleaning the face. From this analysis

obtained the highest vitamin C in the mask with the content of *Aloe vera* extract 15% (w / w). In the content of 15% *Aloe vera* extract, vitamin C levels show 1.066 g/ml and is the highest level.

3.2. Effect of comparison of *Aloe vera* extract on the pH of the mask

Analysis of pH mask to determine the conformity of skin physiology to the mask. In the amount of *Aloe vera* extract added to the mask formula, the pH of the mask increased to 15 grams in 100 grams of mask formula (15% w / w) and decreased at 20% w / W. This can be seen in figure 2. From pH masks to all formulas are still within the standard for physiological pH for the skin of 4.5-7.5.

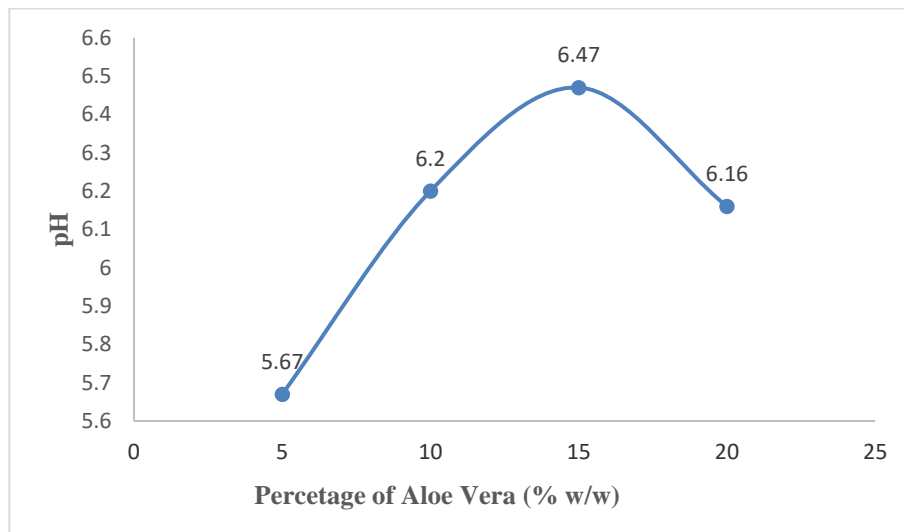


Figure 2. Effect of *Aloe vera* extract on pH mask.

3.3. Influence of *Aloe vera* extract on density of mask

In the amount of *Aloe vera* extract added to the mask formula, vitamin C in the mask increased to 15 grams in 100 grams of mask formula (15% w / w) and decreased at 20% w / w. This can be seen in figure 3.

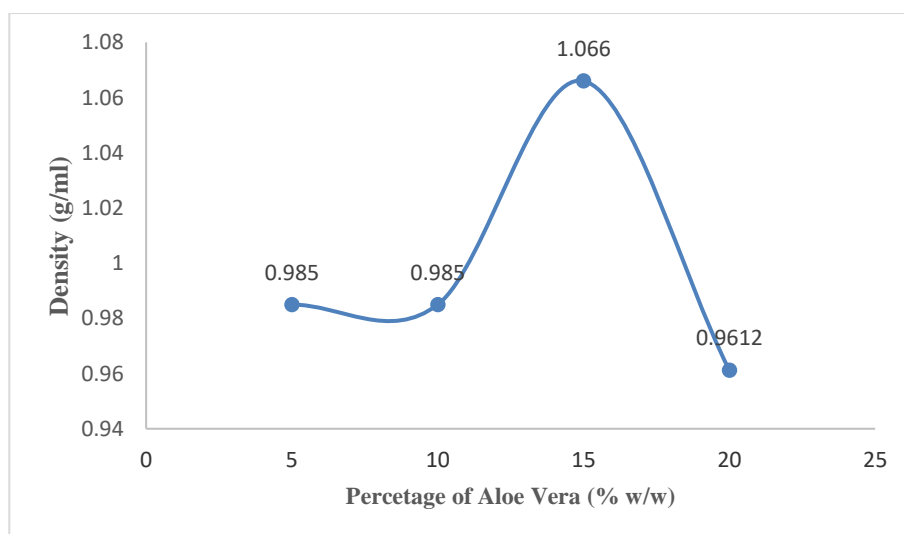


Figure 3. Effect of *Aloe vera* extract on mask density.

3.4. Effect of comparison of *Aloe vera* extract on mask drying time

In the amount of *Aloe vera* extract added to the mask formula, the drying time in the mask increases up to 15 grams in 100 grams of mask formula (15% w / w) and remains at 20% w / w. This can be seen in figure 4. Mask drying time is about 30 minutes longest and for all formula have been qualified. The standard for drying time for masks is 30 minutes [12].

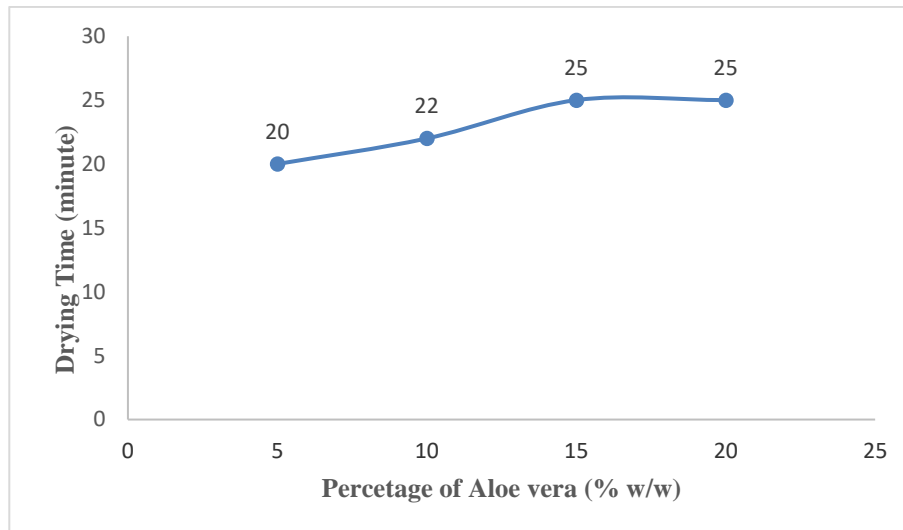


Figure 4. Effect of *Aloe vera* extract on dry mask time.

3.5. Results of favorite test

In the analysis of favorite test conducted on 20 panelists for odor criteria, a soft feeling on the face, a sense of cleanness in the face and color then the results can be presented as follows. Assessment given value 1 for dislike, 2 less like, 3 likes and 4 very likes. The average result of the assessment on each criterion is multiplied by the weights so as to obtain the average weighting rating. For the highest appraisal results it is the preferred panelist mask formula. The results of this study show *Aloe vera* mask with 15% (w / w) *Aloe vera* extract is the best formula favored by panelists. The results are presented in the following table 1.

Table 1. Results of favorite test on *Aloe vera* mask.

Panelists	Average rating of Odor criteria	Average grading criteria on Soft Face	Average assessment of net taste criteria on the face	Average color criteria assessment	Average weight assessment
Weight Criteria	25%	25%	30%	20%	-
Mask of 5% <i>Aloe vera</i>	3.50	3.75	2.75	2.50	3.1375
Mask of 10 % <i>Aloe vera</i>	3.25	4.00	3.25	3.50	3.4875
Mask of 15% <i>Aloe vera</i>	4.00	4.00	3.75	3.75	3.875
Mask of 20% <i>Aloe vera</i>	3.25	2.50	3.50	3.50	3.1875

On testing the viscosity of *Aloe vera* mask with Brookfield Viscometer. The spindle used is the number 7 spindle or the smallest spindle because the spindle is best suited for a sample that has a mass of cream. The size of the viscosity in the sample depends on the speed of the spin and the multiplier factor on the spindle used. From the viscosity testing that has been done, obtained viscosity of 24,000 CP for all formulas.

4. Conclusion

The conclusion of this research is the effect of *Aloe vera* extract on density, pH, vitamin C and drying time. The best content is 15% of *Aloe vera* Extract, 1.066 g / ml density, vitamin C 2.2 gram, pH 6.47, time Drying 25 minutes and viscosity 24,000 CP. On the favorite test with the odor criteria, the soft feeling on the face, the clean feeling on the face and the color done on 20 panelists found the most preferred is the mask with the content of *Aloe vera* extract 15%.

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