



## EFFECT OF EVAPORATION TIME ON PHYSICAL AND CHEMICAL PROPERTIES OF ALOE VERA GEL EXTRACT (ALOE CHINENSIS BAKER)

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### ABSTRACT

Aloe vera gel can be used as raw material for medicine and pharmaceutical preparations by reducing the water content. By reducing the water content is expected to increase the levels of beneficial substances. Evaporation used is vacuum evaporator with maximum temperature 60 °C. The purpose of this research is to estimate the time of evaporation to the properties of the Aloe vera extract gel. Evaporation of Aloe vera gel is done at 60 °C and pressure 72 mbar. Evaporation time is varied at 30, 60, 90 and 120 minutes. At each evaporation time pH, density, refractive index and vitamin C. Vitamin C analysis using HPLC method with ascorbic acid standard. In the pH test, pH ranges from 4.5 to 4.3 at 120 minutes. The refractive index increases because of the longer evaporation time the higher the viscosity and the color closer to the yellow green. The density values ranged from 0.945 g / ml at 30 minutes and 1.0056 g / ml at 120 minutes. For the best vitamin C levels obtained at evaporation time of 120 minutes at 4.1 ppm. In this evaporation condition means vitamin C can be maintained.

**Keywords:** aloe vera, evaporation, gel extraction.

### INTRODUCTION

Aloe Vera is a succulent, belongs to the liliaceae family. There are more than 360 known species of aloe vera. *Aloe barbadensis* Miller is widely used for formulation of cosmetics, functional foods and drugs [4]. The most widely developed species in Asia, including Indonesia, are *Aloe Chinensis* Baker, originally from China, but not native to China. This species in Indonesia has been grown commercially in West Kalimantan and is better known as aloe vera Pontianak [3]. 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, makeup creams, perfumes, shaving creams, bath aids, and many other products [4]. Aloe vera gel contains phenolic constituents. Determination of phenolic constituents of Aloe vera such as Aloin A and B, Aloenin (B), Aloesin and Chrysophanol using LCMS [14].

Aloe vera has drawn attention for its commercial importance in the preparation of nutritional, medicinal and cosmetic products. The time, temperature and sanitation are the prime requirements for processing to obtain the aloe vera plant products in active form. The most important factor is how to extract the gel from aloe vera leaf and to preserve it for long duration for its utilization in food, cosmetic and pharmaceutical products. Aloe vera leaves contain biologically active compounds hence their post-harvest handling and processing needs great care. The gel contains 98.5% water having pH 4.5 and also contains many polysaccharides such as *glucomannan*, *acemannan* etc. in active form in the leaves of aloe vera [16].

Aloe Vera gel clear gel is colorless mucilaginous gel obtained from the parenchymatous cells in the fresh leaves of aloe vera [5]. Agarwala [1] studied the

pharmaceutical properties of aloe and suggested that a clear substance obtained from parenchyma cells, called aloe gel, was colorless and tasteless. 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 [11]. Aloe vera gel can be used as raw material for medicine and pharmaceutical preparations by reducing the water content. By reducing the water content is expected to increase the levels of beneficial substances. Evaporation used is vacuum evaporator with maximum temperature 60 °C. The purpose of this research is to estimate the time of evaporation to the properties of the Aloe vera extract gel.

### RESEARCH METHOD

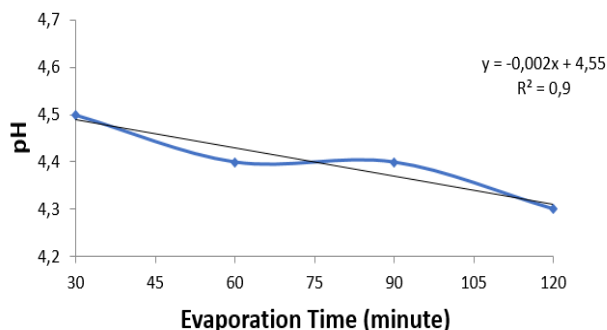
The research was conducted at Applied Chemistry Laboratory, Chemical Engineering Department, Faculty of Engineering, Universitas Muhammadiyah Jakarta and BPPT Puspiptek Serpong Indonesia. Evaporation used is vacuum evaporator with maximum temperature 60 °C. The purpose of this research is to estimate the time of evaporation to the properties of the Aloe vera extract gel. Evaporation of Aloe vera gel is done at 60 °C and pressure 72 mbar. Evaporation time is varied at 30, 60, 90 and 120 minutes. At each evaporation time pH, density, refractive index and vitamin C. Vitamin C analysis using HPLC method with ascorbic acid standard.



## RESULTS AND DISCUSSIONS

### Effect of evaporation time on pH

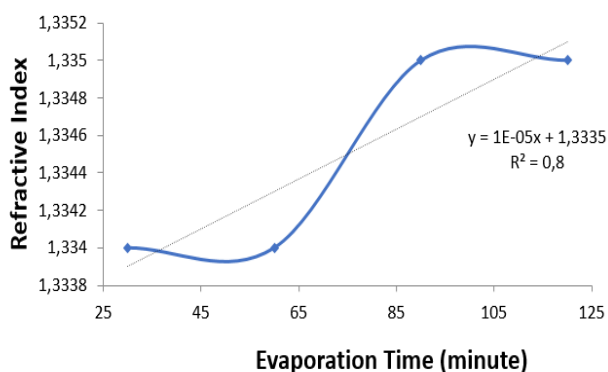
In the amount of evaporation time, pH of Aloe Vera gel decrease 4.5 to 4.3. This can be seen in Figure-1. The amount of water vaporized causes the amount of ascorbic acid content to rise and the pH decrease.



**Figure-1.**Effect of evaporation time on pH of Aloe Vera gel extract.

### Effect of evaporation time on refractive index

The refractive Index determines the transparency of Aloe vera gel extract. Evaporation of water causes the aloe vera gel extract transparency to decrease so that the refractive index rises. This can be seen in Figure-2.

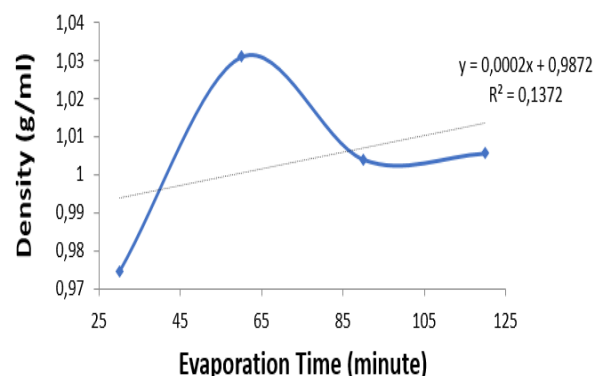


**Figure-2.** Effect of evaporation time on refractive index.

From refractive index values are still seen eligible for aloe vera gel extract. Refractive index is still within standard of 1.334 to 1.335.

### Influence of evaporation time on density of Aloe Vera gel extract

In the amount of evaporation time to density of Aloe vera gel extract can be seen in Figure-3.

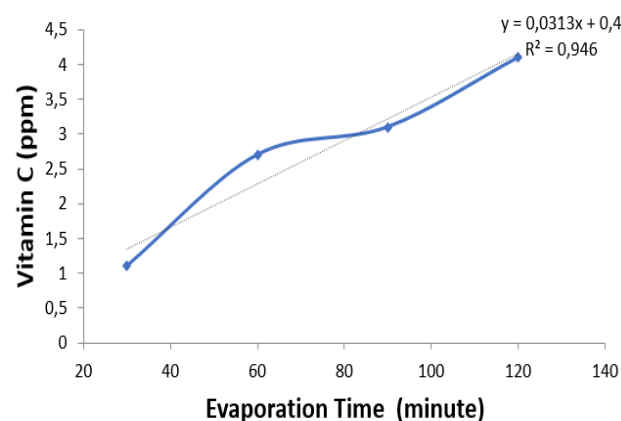


**Figure-3.** Effect of evaporation time on density.

Water reduction in evaporation causes density to change. The density of evaporation for 30 minutes indicates 0.9745 whereas the lowest density is achieved at a time of 120 minutes evaporation indicating that the evaporated water affects the density of Aloe Vera gel extract.

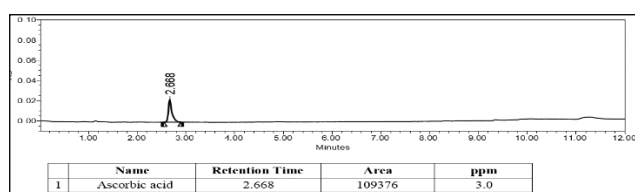
### Effect of evaporation time on Vitamin C with HPLC

The content of vitamin C is strongly influenced from the amount of water vaporized. Aloe vera gel with a water content of more than 99% is expected to be a drug and pharmaceutical preparation if the water content is reduced. The effect of evaporation time on vitamin C content can be seen in the Figure-4.

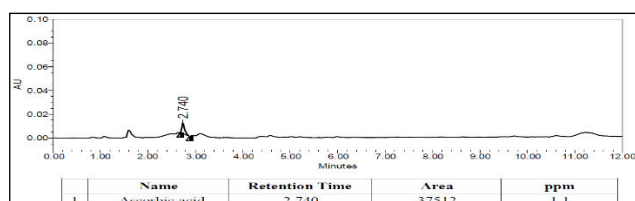


**Figure-4.** Effect of evaporation time to vitamin C content.

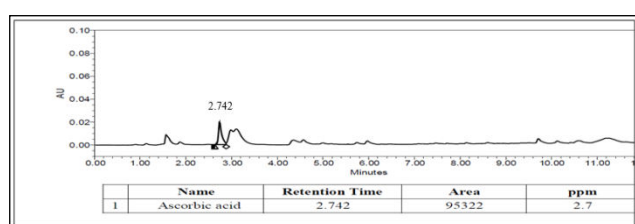
The content of vitamin C has increased in the longer evaporation time. If water is evaporated then vitamin C will increase, this indicates that in evaporation conditions 60 °C and 42 mbar vitamin C content is not damaged. Vitamin C content can increase from 1 ppm to 4.1 ppm. Results of analysis vitamin C with HPLC are presented of Figures 5 to 9.



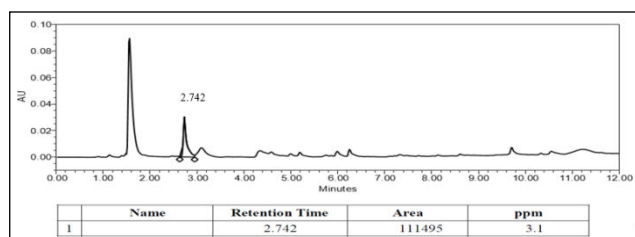
**Figure-5.** Ascorbic acid standard chromatography results.



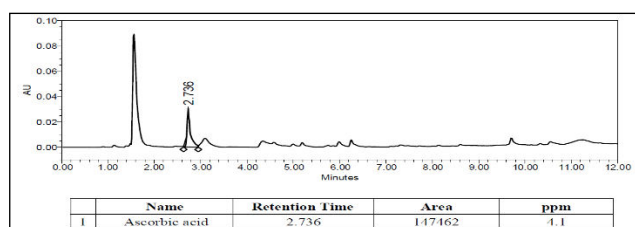
**Figure-6.** Results of Aloe Vera gel extract chromatography with 30 minutes evaporation time.



**Figure-7.** Results of Aloe Vera gel extract chromatography with 60 minutes evaporation time.



**Figure-8.** Results of Aloe Vera gel extract chromatography with 90 minutes evaporation time.



**Figure-9.** Results of Aloe Vera gel extract chromatography with 120 minutes evaporation time.

## CONCLUSIONS

The conclusion of this research indicate that evaporation time can affect pH, refractive index, density and vitamin C. Vitamin C content rises with increasing evaporation time and vitamin C is highest at 4.1 ppm. At a temperature of 60°C and a pressure of 72 mbar, the vitamin C content can still be maintained.

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