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Use of Ambon Banana Peel Solution As a 12 Volt Accumulator Charging Electrolyte

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Abstract

There are so many natural resources that have not been used as a source of electrical energy, one of which is a material that can be used as an alternative source of electrical energy, namely banana peel, a material that is very easy to find in the surrounding environment. It contains carbohydrates and is rich in minerals such as potassium, magnesium, phosphorus, chloride, calcium, and iron. Carbohydrates contain glucose, when glucose is mixed with water and left in an airtight space for several days, fermentation will occur so that ethanol can be obtained. Ethanol will eventually be oxidized to an acid electrolyte. The purpose of this research is to measure the value of no-load voltage, load and load current. The composition of the Ambon banana peel solution consists of water and banana peel which is divided into three groups A1, B1 and C1, with a long fermentation time of 18 days or 360 hours. The results of the measurements in this study with three different compositions obtained the highest value, namely the composition of C1 with a no-load voltage value of 9.53 Volts, a load of 8.66 Volts and a load current of 13.24 mA.

Keywords: *Ambon Banana Peel, Accumulator, Voltage, Current*



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1. PRELIMINARY

Energy is needed in all sectors of life, energy sources are classified into 2, namely renewable and non-renewable energy sources. Renewable energy sources are energy resources that can still be reprocessed naturally and have sustainable processes such as water, sun, wind, and plants. Energy is an important component for human survival because almost all activities of human life are highly dependent on the availability of sufficient energy [1]. The alternative energy is not only environmentally friendly energy that can be renewed through the use of banana peel waste. Seeing these conditions, currently research is needed specifically to use alternative energy sources [2]. Energy is an important component for human survival because almost all activities of human life are highly dependent on the availability of sufficient energy [3]. In the banana peel that has been fermented has acidic properties that come from the content of acetic acid (which is a type of electrolyte). In addition to containing acetic acid, banana peels contain other electrolytes such as potassium and chloride salts. Potassium chloride salts in water can conduct electricity because they

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can be ionized[4]. Banana peel for biobattery applications can act as a conductor because it contains charged particles called positive and negative ions. The use of biobatteries can be in the form of liquid or paste [5]. Bio-Battery is a battery with paste derived from natural ingredients that are environmentally friendly and do not contain harmful chemicals. An accumulator is a device used to store energy in chemical form. Banana peels contain citric acid (CH_3COOH) with a pH value in bananas that are still green, namely 5.02 - 5.6 and in ripe bananas ranging from 4.2 - 4.75. With the level of acidity produced from banana peel liquid, it can be used as alternative energy that is used as a substitute for sulfuric acid (H_2SO_4) electrolyte fluid in batteries [6].

How to use Ambon banana peel solution as an electrolyte to fill the accumulator. Based on the description above, this thesis will develop an experiment on the use of Ambon banana peel solution for accumulator filling electrolyte, as an alternative to sulfuric acid electrolyte.

2. LITERATURE REVIEW

A. Banana peel

Banana peels contain carbohydrates and are rich in minerals such as potassium, magnesium, phosphorus, chloride, calcium, and iron. Carbohydrates contain glucose, when glucose is mixed with water and left in an airtight space for several days, fermentation will occur so that ethanol can be obtained. Ethanol will eventually be oxidized to ethanoic acid or acetic acid. The reactions that occur are as follows:

Strong Electrolyte: HCL , NaOH , KOH

Weak Electrolyte : CH_3COOH

Non Electrolyte : $\text{C}_6\text{H}_{12}\text{O}_6$



Fig.1. Ripe Ambon Banana Skin

Acetic acid is a type of electrolyte. The fermented banana peel has acidic properties that come from the acetic acid content, this is proven when the pH of the solution is measured with a universal pH ranging from 4-5. In addition to containing acetic acid, banana peels contain other electrolytes such as potassium and chloride salts. Potassium and chloride salts react to form potassium chloride salts. Potassium chloride salts in water can conduct electricity because they can be ionized.

B. Ingredients in Banana Peel

Banana peels that can be used as a stable substitute for pasta are Ambon banana peels, while the best are jackfruit banana peels. Batteries are acidic, so acidic fruit peels can generate electricity [7].

The results of the analysis of banana peels in Indonesia show that banana peels have a fairly high food content, to find out more clearly the content in banana peels can be seen from table 1 [8].

Table1. Chemical Composition Between Banana Flesh and Peel

Content	Weight Chemical Composition (mg)	
	Ambon banana flesh and skin	Ambon Banana Peel
Water	65800	70100
Carbohydrate	31800	201000
Fat	200	3200
Protein	1200	450
Calcium (Ca)	10	790
Passport (P)	22	102
Iron (Fe)	0.8	1.37
Vitamin A	950	0.10
B vitamins	0.06	0.18
Vitamin C	10	12.50

C. Accumulator

An accumulator is a device used to store energy in chemical form. If the battery is used continuously it will run out so it needs to be recharged first. Sulfuric acid (H_2SO_4) or commonly called source battery has dangerous properties because if it encounters human skin, it will feel itchy and hot, if it is exposed to cloth, it will have holes, if it is disposed of it will result in a polluted environment, whereas if it is exposed to iron, it will cause the iron to become rusty. this source battery contains sulfuric acid [9].

3. RESEARCH METHODS

A. Research Time and Place

The fermentation time is 18 days or 360 hours with the target of producing a voltage of 6 Volts to 12 Volts. In this study, what will be tested is the magnitude of the current and voltage values obtained from the fermentation of the Ambon banana peel solution. This research has been conducted for 1 month. The place of implementation is at Jalan Canal Borobudur, Gang 1 Private rental.

B. Tools and materials

The tools and materials used in this study are as follows:

1. Used accumulator with 12 Volt specifications
2. Banana peel A1 100 gr, B1 150 gr, C1 200 gr
3. Water A1 200 ml, B1 300 ml, C1 400 ml
4. Digital Avometer
5. Stop watch
6. Measuring cup
7. LED lamp 12 volt 1.5 Watt
8. Scales

9. Scissors

C. Work procedures

Ambon Banana Peel Solution Composition

- 1) A1 is the difference in the composition of banana peels and water, namely 100 grams of banana peel and 200 ml of water. Table of composition of Ambon banana peel solution
- 2) B1 is the difference in the composition of banana peels and water, namely 150 banana peels and 300 ml water. Table of composition of Ambon banana peel solution
- 3) C1 is the difference in the composition of banana peels and water, namely 200 banana peels and 400 ml water.

4. MEASUREMENT RESULTS

A. Voltage Meter (V)

1) Measuring Voltage (V) No-load

The Ambon banana peel solution that has been filled into the accumulator is then measured at no-load voltage. These measurements are in accordance with their respective compositions, which consist of A1, B1, and C1. More details can be seen in Figure 4.1

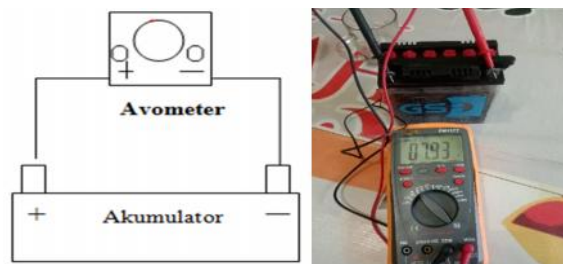


Fig.2. Measuring Circuit

2) Loaded Measurement

Ambon banana peel solution that has been filled into the accumulator then measured the voltage with a 12 Volt 1.5 Watt LED light load. More details can be seen in Figure 4.2.

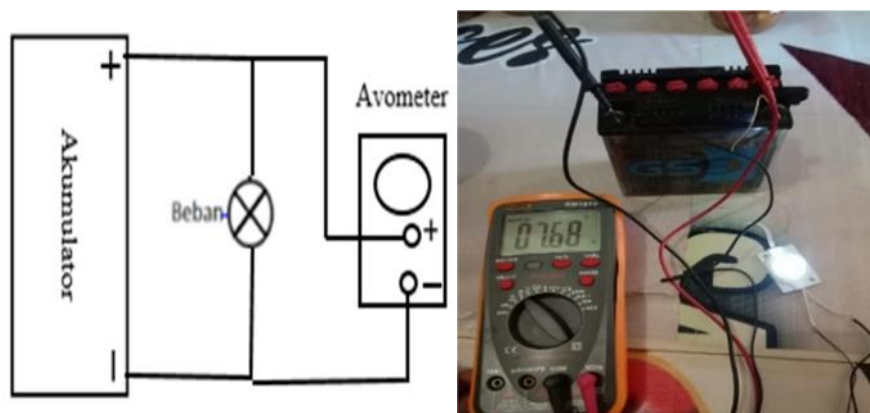


Fig.3. Loaded Measuring Circuit

From Figure 4.2 above, it can be seen that the load measurement was carried out for 60 minutes. The measurement of banana peel solutions B1 and C1 with different compositions was carried out in the same way as the measurement of the A1 solution.

B. Measurement Loaded Current (mA)

Measurement of A1-loaded current using an Avometer with a 12V 1.5Watt LED light load on an accumulator that has been filled with an Ambon banana peel soaking solution, carried out for 60 minutes. In the same way on the composition of B1 and C1. More details can be seen in Figure 4.3.

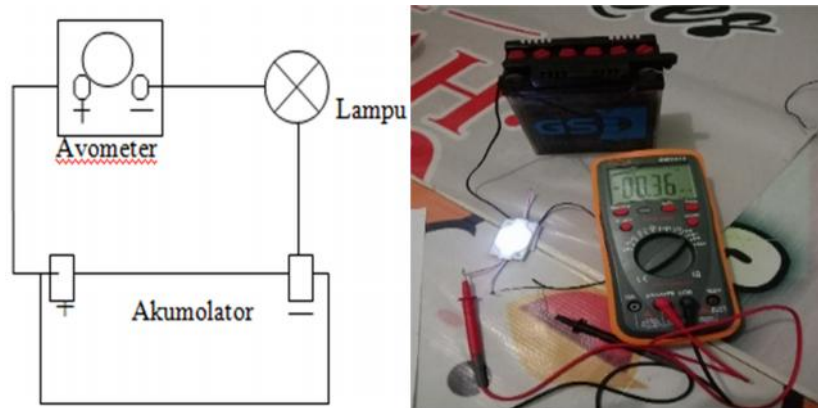


Fig.4. Loaded Current Measurement Circuit

C. Measurement Results of No-load, Loaded and Loaded Current (mA) in Ambon Banana Peel Solution A1, B1 and C1

1) The results of the measurement of the Ambon banana peel solution, composition A1

The results of the measurement of the solution of Ambon banana peel composition A1 with 100 gr Ambon banana peel composition and 200 ml water with a fermentation time of 360 hours for 18 days. Measurement of no-load voltage, load and load current for 1 hour. The results of the measurement on the composition of A1 for 1 hour, namely without a load, obtained a stable voltage of 7.93 Volts, a load of 7.64 Volts and a current with a load of 0.28 mA.

2) Measurement results of the banana peel solution of composition B1

The results of measurements of Ambon banana peel solution B1 with the composition of 150 grams of Ambon banana peel and 300 ml of water with a fermentation time of 360 hours for 18 days with a time of 1 hour using load and without load. From the results of these measurements, the solution of Ambon banana peel without load obtained a stable voltage of 8.26.

3) The results of the measurement of the solution of Ambon banana peel with C1 . composition

The results of measurements of banana peel solution C1 with a composition of 200 gr Ambon banana peel and 400 ml water with a fermentation time of 360 hours for 18 days with a time of 1 hour using a load and without a load. From the results of the study, the banana peel solution without load obtained a stable voltage of 9.53 Volts.

D. Loaded (V), no-load (V) voltage graph on the composition of A1, B1 and C1

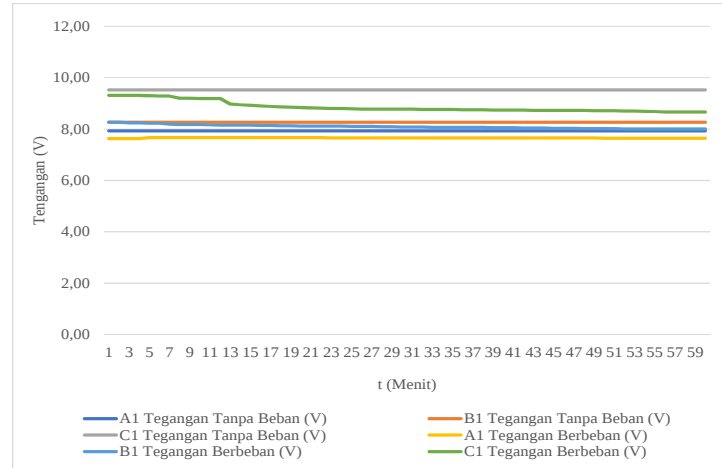


Fig.5. No-Load And Loaded Test Graph

From the graph above, it can be seen that the results of the A1 composition of the loaded voltage at the 4th minute with a value of 7.67 Volts experienced an increase in voltage up to the 23rd minute with a value of 7.66 Volts, after entering the 24th minute the voltage strength decreased until the minute to 24th minute. 60 with a value of 7.64 Volts. While the no-load voltage from 1-60 minutes did not decrease or increase with a value of 7.93 Volts. In the composition of B1 the result of the load voltage at minute 1-2 has an increase in value of 8.26 Volts, at minute 3 to 60 minutes the voltage value has decreased by 8.01 Volts. Meanwhile, the no-load voltage from 1-60 minutes did not decrease or increase with a value of 8.26 Volts. While in the C1 composition graph above, it can be seen that the result of the load voltage at 1-12 minutes has increased in value from 9.31 to 9.19 Volts, at 13 to 60 minutes the voltage value has decreased by 8.66 Volts. Meanwhile, the no-load voltage from 1-60 minutes did not decrease or increase with a value of 9.53 Volts.

E. Loaded current graph (mA) with composition A1, B1, C1

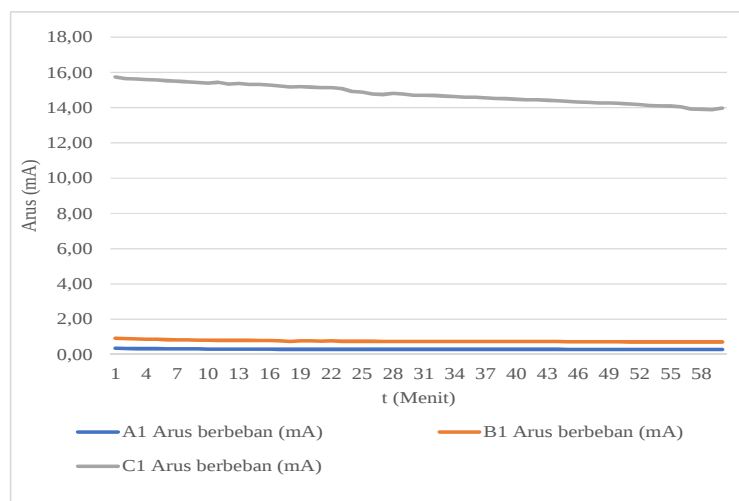


Fig.6. Loaded Current Test Graph

The load current on the A1 composition after being given a load of 1.5 Watt 12 Volt LED lamps produced from the 1st minute has increased, in the 2nd minute to the 60th minute there is a decrease in the current value. This is because the longer the time used, the current strength will decrease.

The load current on the B1 composition after being given a load of 1.5 Watt 12 Volt LED lamps produced from the 1st minute to the 4th minute has increased with a value of 0.54 mA, at the 5th minute to the 60th minute there is a decrease in the current value. This is because the longer the time used, the current strength will decrease, but it is also due to differences in the composition of banana peels.

The load current in the C1 composition after being given a load of 1.5 Watt 12 Volt LED lamps produced from the 1st to the 3rd minute has increased with a value of 14.81-14.73 mA, at the 4th minute to the 9th minute there is a decrease in the value current is 14.61 mA, while at minute 11 there is an increase with a current value of 14.64 mA, at minute 12-29 it decreases in value, namely 14.04 mA, at minute 30 there is a decrease in current value up to minute 60. This is This is because the longer the time used, the lower the current strength.

5. CONCLUSION

Ambon banana peel contains carbohydrates and is rich in minerals such as potassium, magnesium, phosphorus, chloride, calcium and iron. Making 12 Volt accumulator filler electrolyte from Ambon banana peel solution. With a long fermentation time of 18 days or 360 hours, and tested the value of the current and voltage load and no load, with a ratio of water and banana peel, the composition of A1 water is 200 ml, banana peel 100 gr, composition B1 water 300 ml, banana peel 150 gr, the composition of C1 water is 400 ml and banana peel is 200 gr and The results of testing the electrolyte solution can produce the highest voltage, namely in the composition of C1 with a value of 9.53 Volts with a long time of 60 minutes using a 12 Volt 1.5 Watt LED lamp load and The results of the current measurement in the composition of A1, B1 and C1, the highest value is found in the composition of C1 which is 13.24 mA..

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