International Conference on Science, Technology & Education (ICSTE 2018)
Bangkok, Thailand
September 6-8, 2018

An Analysis of Clay Soil Battery Voltage Performance

Nuttika U-panasak[1], Somchai Arunrungrusmi[1], Narong Mungkung[1] and Toshifumi Yuji[2]

[1] Department of Electrical Technology Education, King Mongkut's University of Technology Thonburi, Bangkok, Thailand
[2] University of Miyazaki, Miyazaki, JapanAffiliation 1
* Correspondence: Narong_kmutt@hotmail.com

Abstract: This study was set to produce the electricity from the soil. Clay in which the principles of soil minerals with positive and negative ions are reacted with the cathode and anode. As this principle, the output voltage is generated to the terminal out. By bringing each soil type is clay loam, sandy clay, sandy loam. It tests the voltage in the soil at temperature and moisture constant with same condition of volume, acidity and alkalinity. Small cross-sectional area of the cathode and anode are equal. The cathode and anode sheets material are copper and zinc, respectively.

The results showed that clay loam soil produces the best voltage about 1.4 volts per cell. The system is tested using 12 Volt LED with 16 to 14 hours long.

Keywords: soil; ground battery.

1. Introduction

The demand for energy is increasing rapidly. The energy used in the production of electricity began to decline, such as coal, geothermal. In the future, there may be insufficient production to meet the increasing energy demand.

Free energy may include electrostatic motors, geographical geographic, air, sea and battery batteries. However, chemical soil. Reactions and relationships with electrons may be earth batteries. Explore the potential of low-voltage alternating current to high-voltage LEDs in large distances in remote areas. They can also be considered. To replace the current low voltage power supply. Ionization equipment Batteries may be considered for similar uses. However, it can use a large amount of electricity to generate electricity. And the work of the grid system. In view of the global energy crisis. Due to the end of oil and gas in the next 50 years, 60 years is very important to look for. Alternative Energy Sources

Soil energy is an alternative to electricity generation, although not enough to meet the electricity demand. However, the ground is chemically reactive. This is the basis for making batteries from the soil. If we bring different types of metals. To put it into the soil, the electricity occurred. But too little voltage. The need to find a way to produce more voltage.

The alternative energy is used to produce electricity [2-3], although not sufficient to meet the electricity needs them. But it can reduce reliance on the use of primary energy into the ground, it has a chemical reaction [4] and the gravity of the electron. Which is the basis of making the battery from the soil. If we take the different metals. Put into the earth, that the electromotive force occurs. But the voltage is too low. Therefore need to find ways to produce more and more voltage.

In this research study is to design and construct the batteries from the soil. Using distilled water vehicle. A medium that allows for increased electricity production. The key test in two categories: 1) the type of soil, such as clay, sand, loam, clay, sand, salt, etc. 2) the nature of the soil, such as soil, dry soil moisture.

2. Theories Battery Ground.

Thus an "earth battery" is a pair of electrodes, of two dissimilar metals, with moist earth used as an electrolyte. To create the battery, Bain buried plates of zinc (anode) and copper (cathode) in the ground about one meter apart producing an output voltage of approximately 1 volt. This study creates earth electrodes out of two dissimilar metals. The hypothesize what soil conditions are best for creating an earth battery.

The battery consists of anode and cathode plates of the acid solution. In this virtual cathode to the anode of clay or clay plates is humus or organic matter to the soil as the Earth or ground organic matter decomposition derived from all living creatures. Solution of acid or electrolyte post. The interpretation of the soil is composed of urea. Solution of nitrate or other salt is soluble fertilizers and plant nutrients in the soil. Important part is suspended in the solution of the soil. Consists of two parts: the anions and cations. The nutrient Cation is a positively charged nutrient elements. Anion is the negatively charged components of plant nutrients. Anion or anionic group can recognize simple symbols ending with ates as Nitrate Sulphates etc.

Steel plate to attract the battery fully charged. The substances or elements with high charge is sucked into the cap tightly and more. Success in the management of plant nutrients in the soil, not only on the amount of nutrients. But right proportion or balance is particularly important in assessing the integrity of the nutrients in the soil. (Fertile soil) will have a way to measure the value of the Cation Exchange Capacity (CEC) is the capacity to exchange ions per cent saturation of the base of the acidity - alkalinity (PH) proportional to the concentration of the nutrient. various (In the form of ions or ion) battery the size of a small car, they can use smaller batteries. But if it's a big car, it requires a large battery with a battery of the same size that have different out.

The charge or energy (nutrients), it may well mean that the CEC of cations such as calcium, magnesium, potassium, exchangeable potassium Cho Stadium. And can absorb the nth surface or soil particles by measuring the CEC in chemistry will be measured out to be. milli-equivalents per 100 grams (meg/100g) by each soil type has the value of the ion-exchange capacity (CEC) Electrolytes with different conductivity. Usually the battery will not work if we add only water alone, but will require acid to cause an electric current. Usually electrolytes out. (Electrolyte) in the soil is a key component in bringing nutrients in soil solution to the plant through the roots. In this salt or brine. (Which is mostly in the form of fertilizer salts as fertilizer or organic fertilizer) is a good conductor itself. If plants are not salt (Nutrient solution or fertilizer) would be too few trees show symptoms or pale brown, but if it gets too concentrated salt or fertilizer will burn the leaves show signs Base saturation represents the size of the battery.

3. Experimental Setup

In experimental design, the plastic bottle is then applied in the experiments. Cut to size, then take the same kind of rock debris, leaves, trash or debris pick out. The soil used in the experiment is clay loam, sandy clay and sand into the prepared container. By putting in a volume equal to that of copper rod (anode), an air duct sizes ¾ inch long, 15 cm connecting cable to use. Copper plate, 25 cm long and 15 cm wide, as shown in Figure 1, and it compares the results.

4. Results

In experiments on this topic. Bring the original container with the soil types tested by testing of soils with little moisture. Soil moisture. Waterlogged soil water And soil soaked with distilled water. To measure voltage. Compare the results.

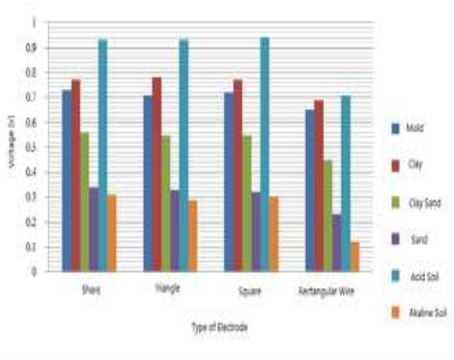

Figure 1 Shows the relationship between the shape of the conductor plate and the voltage.

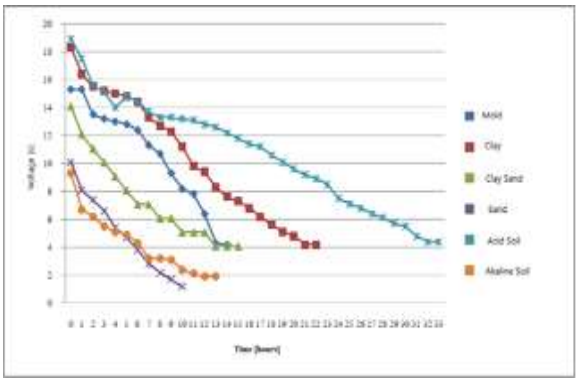

Figure 2 Show the relationship between time and voltage.

Change the types of experiments to compare the voltage per cell. Volume of the same capacity. Voltage optimized by the percent moisture of soil types, about 45% soil temperature each average 28 degrees Celsius and pH - alkaline soil types averaged 6.9 pH, as the graph in Figure 1 shows that soil. Mold is the best voltage is 0.92 volts per cell.

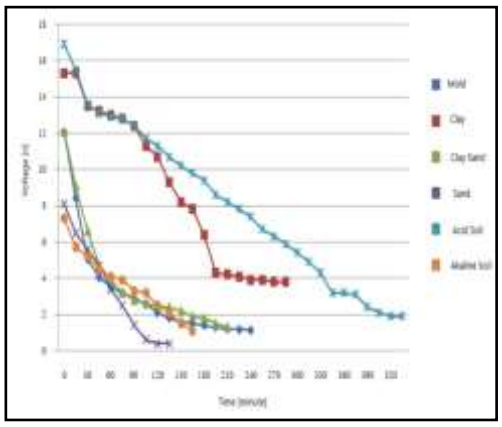

Figure 3 Show relationship time with the voltage of each type of soil. Case load resistance

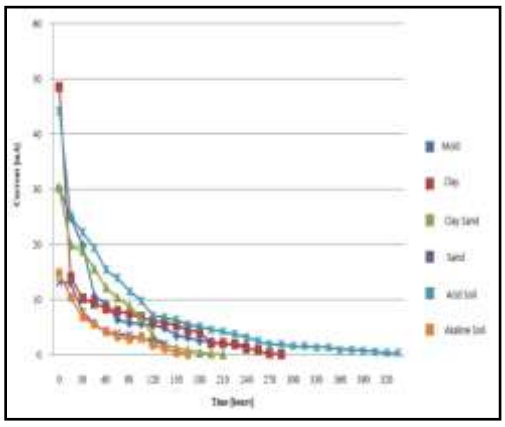

Figure 4 Show relationship time with the current of each type of soil. Case load resistance

Figure 2. is a graph showing the relationship between the time and the voltage of each type of soil. It is found that the acidic soil has a maximum voltage of 18.9 volts and takes time to make the LEDs go out. Almost 33 hours are unseen because of the acidic conditions. The alkaline soil provides a minimum voltage of 9.3 volts, but it can make the LEDs brighter. Sandy soil has duration of less than 10 hours

Figure 3 shows that when the load resistance is 0.1 ohm, the discharge time of each type of soil is higher, with the maximum average of 320 minutes. The maximum voltage is acidity 16.9 volts and shorter than the LED loading. And the voltage drops quickly because the load is low resistance. However, the soil with the lowest voltage is the soil is alkaline. There is a very short time that the LED light loads.

Figure 5 shows the relationship between time with the temperature of the anode plate and delete in each soil. Case load resistance the temperature was higher than the normal temperature. It is because the soil and the conductor sheet react.

5. Conclusion and discussions.

The potential of each type of soil was determined by collecting six soil samples: clay, clay, clay, sand, sand, soils, acidic soils and alkaline soils. An average of 1,800 cubic centimeters Acidic soil The

maximum voltage is 0.91 volts and the lowest voltage soils are alkaline soils with a voltage of 0.32 volts.

In the experiment, the size of the conductor plate was influenced by the size of copper plate (anode), galvanized sheet (negative), cut to 1x1 square centimeters to 10x10 square centimeters. When copper and zinc are equal, The average voltage of the conductor is 4x4 to 5x5 square centimeters. Each of the soil samples were subjected to an anode or copper plate. And the negative change and keep the negative or zinc plates constant. The galvanized sheet (cathode) is cut into rectangles of 1x1 square centimeters to 10x10 square. The cross sectional area of the two conductors is copper and zinc. Whether it changes or fixed. When increasing the conductor space to 4x4 square centimeters, the voltage will start to stabilize according to the characteristics of each type of soil. In the experiment, the shape of the conductor was cut by cutting the copper and zinc conductors into various shapes such as triangle, square and wire. The cross sectional area of 25 square centimeters That affects the voltage production. And squares The average voltage of each soil type is highest. And curled wire into a square. The average voltage of each soil type is lowest.

In the experiment, the loading of LEDs for acidic LEDs gave a maximum voltage of 18.9 volts. And the time to make the LEDs go out or nearly blind at 33 hours, the alkaline soils have the lowest voltage 9.3 volts, but it can make the LEDs brighter. down Sandy soil has a short time to light the LEDs than all types of soil at 10 hours, while the electricity generated from the soil at lower values results in a lower brightness of the LEDs.

In experiment with the temperature of each anode plate, it was found that the temperature at the anode of each soil was high at room temperature. This is because in the discharge. The temperature of the pads in each soil type. It was found that the temperature in the negative plate was close to that of the anode plate. But the temperature is fixed.

In the experiment, the voltage from each soil was tested. The 0.1 ohm load was applied at the fastest discharge time of the soil, with an average of 320 minutes. The maximum voltage was 16.9 vol. Shorter than the LED light load. And the voltage drops quickly. Because the load is low resistance. But the soil that provides the least voltage. The soil is alkaline. There is a very short time that the LED light load.

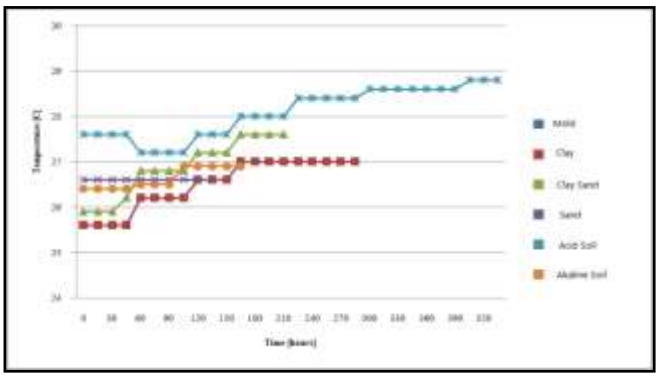

Figure 5. Show Relationship Time with the temperature of the anode plate in each soil. Case load resistance

References

1. Gish, O. H. 1989. The Natural Electric Currents in the Earth's Crust. The Scientific Monthly. Vol. 32. pp. 5-2.
2. Ryeczek. 1984. U.S. Patent 4,457,988 Earth battery. July 3: 1-5.
3. Daniel Drawbaugh. 1897. U.S. Patent 211,322 Earth battery for electric clocks. January 30: 1-2.
4. Dieckmann, George F. 1885, U.S. Patent 329,724 Electric Earth Battery. November 3 : 1-2.
5. E. Katz, "Alexander Bain",The history of electrochemistry, electricity and electronics; Biosensor & Bioelectronics