Carbon battery

[redacted]
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In recent years, I have heard many topics about power generation. In particular, global warming is regarded as an environmental problem. While we were there, we were familiar with it and wanted to make electricity, so we came to this research. In the first place, Japan, where we live, has many disasters, and there are many power outages associated with it. At such times. I think it would be more reassuring if we could generate electricity with something familiar to us. And we took notice. Is a charcoal battery. However, charcoal batteries have major drawbacks. It can generate a lot of electricity. You can't. We conducted an experiment centered on improving it. Advance of seniors

Studies have shown that increasing pressure increases the amount of electricity that can be produced. But it was insignificant. Therefore, we thought that metal might promote electricity, and measured the electric power that could be produced by mixing metal with Bincho charcoal. By doing so, it was possible to generate more electricity than if only Bincho charcoal was used to generate electricity. Also, increase the amount of Bincho charcoal and fruit. It was confirmed that the power increased even after the test.

1 Background

Although batteries are very convenient, they also have some dangers. Many reports in Japan are ignition and short circuit due to liquid leakage inside the dry battery and deterioration of the dry battery. Batteries are useful not only in many everyday situations, but also because they are small in shelters in the event of a disaster and can be used in a variety of devices. In recent years, it is not uncommon for disasters to occur in Japan. It has been reported that dry batteries deteriorate even when they are not used, and when they are used in evacuation shelters, they short-circuit or catch fire.

Therefore, we decided to conduct an experiment with the goal of generating sufficient current by changing the conditions using a battery with an extremely low risk of ignition and liquid leakage.

There are several safe batteries, but since elementary and junior high school students use them in experiments, we decided to use charcoal batteries, which are widely known. Previous studies have shown that by adding the two elements of ″increasing the amount of charcoal″ and ″applying pressure″, it is possible to generate a larger current than the original charcoal battery.

Background②.....We thought that how can we get more electricity?From previous researches, we knew two results. We prepare First, pressing carbon battery can make produce more electricity than without pressing it.Second, adding more carbon battery can make more electricity than a small amount of carbon , too. From these results, we thought that we can get good score by adding something which can through electricity.

Introduction.....We will introduce how to make our carbon battery.We from the bottom to the top,Aluminum,Paper towel into salt water ,Carbon powder and Aluminum. We use this system as one set.

Hypothesis.....From background two, we thought that we can produce more electricity by using metals because of characters of metal.First, all of metals can through electricity. Second, we can treat easily metal foil.

Material

- press machine
- powder carbon
- salt water
- paper towels

Method.....1 Mix the metal foil into carbon powder

.2 Connect ammeter to carbon battery

.3 Measure the electric

2 Experiment

◎ Why did you bother to conduct the experiment using Bincho charcoal, which costs more than barbecue charcoal? the law of nature

The reason is the difference in the structure of each charcoal.

The photo below shows a porous structure that can be seen in Bincho charcoal but not in barbecue charcoal.

Porous structure simply means that there are many cavities in the structure of a substance, and there are cavities of various sizes.

The hollow part contains a lot of gas in the air including oxygen.

In other words, since more reactions are carried out in the charcoal battery, it is possible to generate more current than other charcoal.

Although there is no big difference compared to barbecue charcoal, the price is high.

3 Result

◎ Results of the first stage experiment

He measured the amount of power generated by one layer without adding metal and with a mixture of copper and silver, and the results were as follows.

Charcoal battery condition	Electric-generating capacity
No metal	300mA
Copper mixture	340mA
Silver mixture	410mA

From the table, it can be seen that there is no noticeable difference between the one without metal added and the one with copper mixed. One silver can generate a large current compared to the other two batteries.

Since the conditions other than the type of metal were not changed at all, it is considered that some difference in the properties of the two metals used in the experiment caused the difference in the results of the experiment.

We couldn't get a definite result about the difference in the properties of the two

metals, silver and copper, but I thought that the difference in conductivity might have caused such a difference.
Ag> Cu> Au> Al> Fe
When comparing silver and copper, it is silver that conducts electricity more easily. Therefore, I thought that the charcoal battery mixed with silver could send more current faster and more efficiently than the charcoal battery mixed with copper, although it was a little.

◎ About the second stage experiment
In the first stage experiment, it was found that the one mixed with silver can generate the most current, so in order to generate more current, the second stage using a charcoal battery mixed with silver. I decided to experiment with the changes caused by the difference in the number of layers.

The results of the second stage experiment are as follows
Twice
Number of layers of charcoal battery
Electric-generating capacity
1 layer
410mA
2 layers
470mA
3 layers
680mA
4 layers
960mA
5 layers
1600mA

The result of the 5-layer experiment is that it can generate a current exceeding 1.5A, which is required to charge a smartphone.
From these results, it was found that he could generate more current in the series circuit as well as the dry cell and the unmixed charcoal battery.
Also, since the current increased due to the series circuit, it was also found that if it could be miniaturized, it could be used for various devices as well as dry batteries.
In other words, if the material used this time can be used as it is to make the container lighter and more compact, it can be said to be a practical and practical battery.

[Reference]

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Charcoal and aluminum batteries

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Nature and structure of charcoal

https://www.rinya.maff.go.jp/j/tokuyou/mokutan/seisitu.html

・ Yonago National College of Technology
Performance evaluation and miniaturization of charcoal batteries

https://www.jstage.jst.go.jp/article/ieejpes/139/3/139_NL3_7/_pdf/-char/ja

・ Masudaya, a trading company specializing in charcoal
Characteristics of Bincho charcoal
(Porous structure and other features)

https://www.masudaya.co.jp/gyomu/powder/tokusei_bincho.html