THE POTENTIAL OF HEAT TO GENERATE ELECTRICITY

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JUDUL: USING THE SURROUNDING HEAT TO POWER THE FAN.

IJAZAH: DEGREE OF BACHELOR OF SCIENCE WITH HONOURS

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DECLARATION

I hereby declare that this dissertation contains my original research work except for the sources of findings reviewed herein, which have been duly acknowledged.

4 APRIL

Calvin

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I'm glad that I could finish this project on time. Even so the project was not really successful, but from doing this project, I learn something news and more clearly about the electron movement. There is not easy to produce electricity. We have to consider more and do more research.

First, I want to thanks for my respect supervisor, Miss Fauziah Sulaiman. She helps me a lot while doing this project. She gave me a lot of advice and support on doing this project. And also, she gave me a lot of idea how to search and what I need for completing my project. The format that she marks was extremely perfect. I had no worry about the all marking that she made. Besides that, I would like to thanks Dr. Jedol also because gave me some very useful advice to complete my project.

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ABSTRAK

Objektif utama dalam disertasi ini adalah untuk menghasilkan arus elektrik dengan menggunakan tenaga haba. Ini dipanggil pergerakan elektron dalam keadaan panas. Di percaya bahawa sekiranya arus elektrik yang secukupnya dihasilkan, ia mampu untuk menghidupkan kipas. Dalam projek ini, bahan natural telah digunakan untuk menyerap haba seperti pasir. Dan, electrode yang digunkan adalah seperti aluminium, zink dan kuprum supaya membolehkan pergerakan elektron berlaku. Suhu akan mempengaruhi pergerakan elektron. Semakin tinggi suhu, semakin cepat pergerakan elektron. Eksperiment dijalankan dengan mengkaji suhu yang berbeza seperti mengkaji pasir yang terletak pada cahaya matahari $32°C - 35°C$, pasir yang berada dalam suhu bilik $27°C$ dan pasir yang telah dipanaskan $50°C - 60°C$. Dalam eksperiment ini, didapati bahawa voltan dan arus yang dihasilkan melalui pergerakan elektron adalah sangat kecil daripada yang dijangka. Tidak terdapat voltan yang mengcukupi untuk menggerakan litar yang dicipta yang memerlukan 3V sahaja akan berfungsi. Makximum Voltan yang didapati ketika ekperiemt dijalankan adalah hanya 0.034mV. Dan, minimum voltan yang didapati adalah sangat sangat kecil, iaitu 0.005mV. Ini masih jauh lagi daripada 3V yang diperlukan untuk menfungsikan litar. Kesimpulan bagi projek tersebut adalah terdapatnya banyak had. Seharusnya untuk memikirkan cadangan yang berlainan selain daripada menggunkan haba.

ABSTRACT

Main objective of this thesis is to generate electricity by using the heat. We called this thermal electron flow. Within this, believe that it will help to switch on the fan if there is enough electrical produced. In this project, natural material had been used to help absorb the heat to allow the electron moving. And, the material used that can allow the electron flow was aluminum, copper and zinc. Copper is set the as the constants, which combined with aluminum and zinc. The temperature will affect the electron flow. The higher the temperature, the faster the electrons flow from the electron to hole. And so, the higher of the temperature will produce more voltage and current. So, test the experiment with some of the sand place outside under the sun which is between $32°C - 35°C$, some place in room temperature at $27°C$, and some by heating until $50°C - 60°C$ to get the vary temperature. From this experiment, it found that there were only extremely small voltage and current produce by the electron flow. So, there is not enough voltage to switch on the circuit that created, as planed to test the electrical generate by 3 V. The maximum voltage generated during the experiment was only 0.034mV. And the minimum of the voltage was 0.005. That is still far away from 3V. The conclusion of this project was that there is too many limitation of it. It's needed to re-think of the limitation and re-do this project with different idea, but not only using the heat.

CONTENTS

TABLE

FIGURE

GRAPH

No.Graph Pages

CHAPTER 1

INTRODUCTION

1.1 The background of the research

Nowadays, electric energy can said very useful for the human to do any work. Without electric energy, we can't do many things. Between this, to reduce the use of energy electric, we were trying another way to produce electric energy, which is using the heat and change the heat into electric energy. As we know, we can produce the electric energy just if there have movement of the electrons. It can be seen like the electrolysis. With this idea, we will try to test the potential of the heat to generate the electricity.

The using of air-conditional is too dependent to human. The air-conditional is using too much of the power energy. In this project, we try to detect the different heat from difference place. With this, we get the different temperature to generate the electricity. We choosing some foils as an electrode to allow the electrons flow. The substance that we use to absorb or collect the heat is from the natural material, which is sand. The electrons inside the foils will moving and produce a current and voltage. This idea is helps to reduce the using of the electricity. Beside that, there have some village that without the electricity. Is that they will more uncomfortable then us who stayed at town? We also hope that this project can really help to generate the electricity as well.

1.2 Purpose

The purpose to do this project is to help determine the new ways to produce electricity. Besides that, we are hoping to ensure that how far the heat can generate the electricity. Is that the electricity produce large enough to switch on the table fan? or just a simple fan with small voltage.

1.3 Hypothesis

We predicted that the electricity generate by the heat are maybe not enough to switch on the table fan. So, in this project, we create a circuit with a small fan that can be moving just by the small voltage.

1.4 Limitation

There is too much limitation on doing this project. The sand that we use is only in certain amount. So, maybe just a little sand will produce small voltage or current. Besides that, only 3 types of foils we are using, which is aluminum, copper and zinc. And also, maybe sand was not the good material use to absorb the heat.

CHAPTER 2

LITERATURE REVIEW

2.1 Electromagnetic

Electrons play a very important role in magnetism. The real key between electricity and a magnetic field is motion. Consequently, the current flow which is the movement of the electrons produces a magnetic field (Cook, 1996).

In 1820, Danish physicist Hans Christian Oersted accidentally stumbled on an interesting reaction. As he laid a compass down on a bench he notice that the compass needle pointed to an adjacent conductor that was carrying a current, instead of pointing to the earth's north pole. It was discovery that first proved that magnetism and electricity were very closed related to each others. This phenomenon called electromagnetism since it is now know that any conductor carrying an electric current will produce a magnetic field. He's discovery also that the flow of electricity produces magnetic effects opened a vast new era for the use and production of electricity (Multi-Amp Institute, 1992).

In 1831, the English physicist Michael Faraday (and Joseph Henry independently at about the same time) observed that when a closed circuit moved across a magnetic field, a current was generated in the circuit even though there were no batteries in the circuit. (Pramanik, 2006). The same effect was found to be independent of the type of the source of the magnetic field. This phenomenon was named by Faraday as electromagnetic induction. It concluded that the process by which a current is produced by a changing magnetic field is called electromagnetic induction (Hopkins, 1997). The results of the experiments carried out by Faraday could be summarized following two laws which were enunciated in about 1845.

- Neumann's law – when the magnetic flux linked with a coil or circuit is changed in any manner, then an EMF or voltage is set up in circuit such that it is proportional to the rate of change of the flux-linkage with the circuit.
- Lenz's law – The direction if the induced EMF is such that any current which it produces tends to oppose the change of flux (Hopkins, 1997).

2.2 Electron Theory Of Magnetism

The spinning motion causes each electron to become a tiny permanent magnet. Although all electrons spin, they do not all spin in the same direction. In most atoms, electrons spin in opposite directions tend to form a pairs. Since the electron pairs spin in opposite directions, their magnetic effects cancel each other out as far as having any effect on distant objects (Multi-Amp Institute, 1992). In a similar manner, the two magnets connected together would be strongly attracted to each other but would have little effect on surrounding objects.

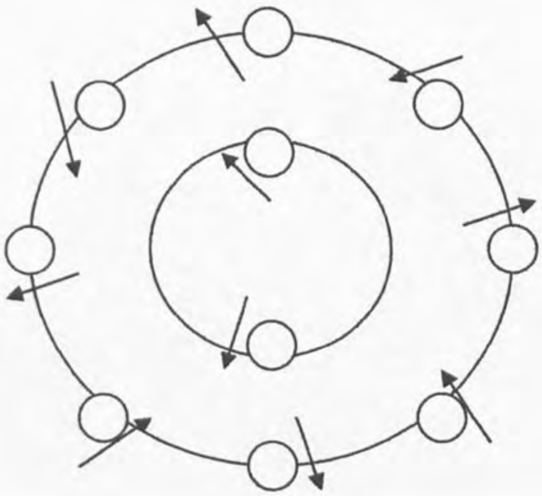

Figure 2.1 The spin of the electron.

(Multi-Amp Institute, 1992)

The electron theory help visualize atoms and electron as they relate to electrical and electronic phenomena, and the previous description of atomic structure are part of this electron theory (Meade, 1994). Figure below display common sources of energy causing electron movement of separation of charge.

- Batteries(a)
- Generator or alternator(b)
- Magnetic energy
- Light energy(c)
- Heat energy(d)

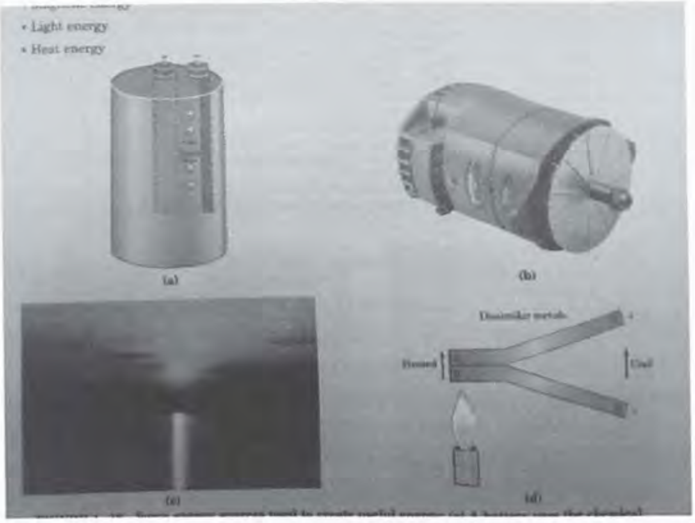

Figure 2.2 The example of energy that causing by the moving electron (Meade, 1994)

2.3 Magnetic field, Flux and Poles

Electromagnets depend on electric current flow to produce a magnetic field. They are generally designed to produce a magnetic field only as long as the current flow is flowing, they do not retain their magnetism when current flow stops. Electromagnets operate on the principle that current flowing through a conductor produces a magnetic field around the conductor. The discovery Hans Christian Oersted 1820, a Danish physicist that the flow of electricity produces magnetic effects opened a vast new era for the use and production of electricity (Multi-Amp Institute, 1992). He proved that a magnetic field is established around a conductor-carrying current. The field exist as concentric circles as below:

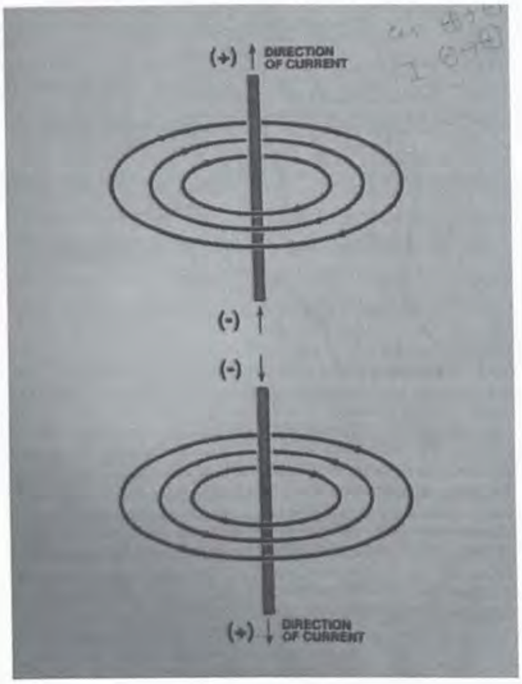

Figure 2.3 Magnetic field move around the current flow

(Multi-Amp Institute, 1992)

The direction of the magnetic field can be determined if the direction of the current is known by using the left-hand rule for conductor. Left-hand rule can be used to clearly illustrate that if the polarity of the magnetic field is changed or if the direction of armature rotation is changed, the direction of induced current also changes. To use the left-hand rule, place the thumb, forefinger and center finger at right angles to each other.

This rule is more conventionally stated 's' the right-hand rule in which thumb of the right hand points in the direction of flow of current, the extended fingers point in the direction of the magnetic field and the direction force is on a line perpendicular to the plane of the palm (Hopkins, 1997).

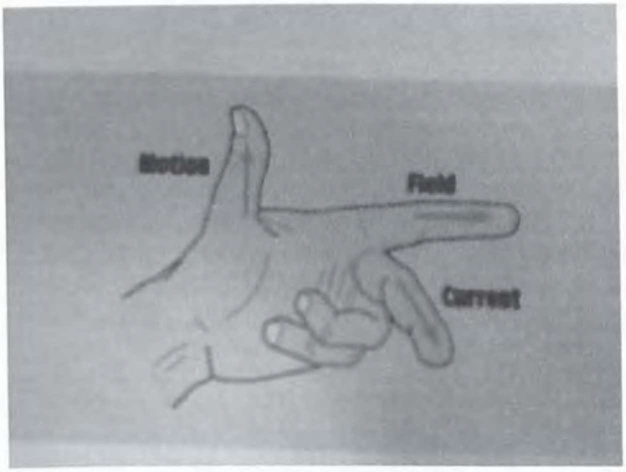

Figure 2.4 Left-hand flaming

(Hopkins, 1997)

Thumb= thrust

Forefinger = flux

Center finger = current

The force of magnetism is referred to as a magnetic field (Fowler, 1994). This field extends out from the magnet in all directions, as illustrated in diagram below:

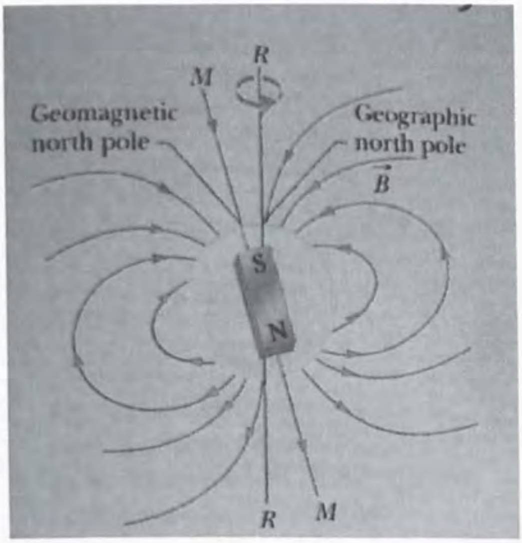

Figure 2.5 Line of force of the magnetic field

(Halliday, Resnick and Walker, 2005)

The invisible lines of force that make up the magnetic field are known as magnetic flux. The lines of force are drawn close together where the magnetic field is strong and farther apart where the field becomes weaker. The flux is most dense at the poles. Therefore, the magnetic field is strongest at the end of the magnet (Fowler, 1994). The arrows indicate the direction of the flux. Lines of force are always assumed to leave the north poles (N) and enter the south poles(S) of a magnet. North and south refer to the polarity of the end of the magnet (Fowler, 1994). It is important to note that there are two factors about the magnetic lines of force (Grob and Schultz, 2003):

- The magnetic lines are circular, as the field is symmetrical with respect to the wire in the center.
- The magnetic field with circular lines of force is in a plane perpendicular to the current in the wire (Grob and Schultz, 2003).

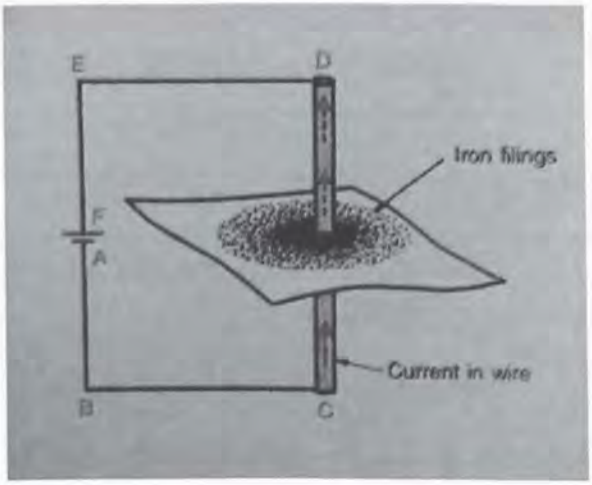

Figure 2.6 The magnetic lines is circular around the current

(Grob and Schultz, 2003)

From the figure 2.6, we know that from points C to D in the wire, the circular magnetic field is in the horizontal plane because the wire is vertical. Also, the vertical conductor between points EF and AB has the associated magnetic field in horizontal plane. Where the conductor is horizontal, as from B to C and D to E, the magnetic field is in a vertical plane (Grob and Schultz, 2003).

Like magnetic poles repel each other. The two north poles and two south poles create a repelling force. The closer poles are, the more they repel each other. Unlike magnetic poles create a force of attraction. Much of the flux of the two magnets joins together to form the force of attraction.

(A) (B)

Figure 2.7 (A) Two unlike poles. (B) Two like poles

(Petruzella, 1993)

We know that the like poles repel and unlike poles attract. It can also be considered that fields in the same direction repel and opposite fields attract. There is a difference in field strength, providing a net force that tends to produce motion (Grob and Schultz, 2003). The direction of motion is always toward the weaker field. The stronger field moves to the weaker field, tending to equalize the field intensity. From the figure below, it's shows that the motion of the magnetic poles. The lines that are more closed shows the fields is more stronger. Vice versa, the weaker field shows by

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