

Obtaining Electric Energy through Photovoltaic Cells of Copper

Faiver Tovar Galindo¹ and Gerardo Rivera Barrera²

¹ *Environmental Engineering, University Corporation of Huila, Colombia..*

² *Industrial Engineering, University Corporation of Huila, Colombia.*

E-mail: ¹ faiver.tovar@corhuila.edu.co; ² gerardo.rivera@corhuila.edu.co

Abstract

The energy electric is not present in nature as the main energy source and as a result, we can only it have thanks to the change of some other energy form. That's why have emerged all kind of generating plants from fossil fuel, however, it has been noted that this form of generation produces much pollution and devastation of enviromental wealth that has our planet.

Copper is an essential material for the production and transportation of energy and help to the transformation of the clean and sustainable energy.

For this reason, is necessary which electricity no polluting the environment, this possibility of production can be through the solar cells of copper, which is a device that convert light energy from the sun into electricity. Solar cells that are used in the cottages and others are made of silicon and require much technology to build them.

Keywords: Solar cells, copper oxide cuprous, semiconductor, bio-digester

INTRODUCCIÓN

Current environmental problems on the exploitation of resources, creates damage on the environment, which leads us to seek alternatives from resource handling, as in our case, we propose the possibility of an alternative energy obtained from cells photovoltaic copper [1][2].

Currently, electric energy consumption continues to increase by one percent per year [3]. To be to respond to this increased demand, in first step it means promoting the rational use of energy, this is, use the minimum amount of energy to the same level of comfort, especially to improving energy efficiency [4]. Thanks to its extraordinary conductivity, copper significant decrease in the loss of energy [5]. In industry, for example, a study published in 2004 showed that it could save more than 200 billion KW/h per year, simply by adopting high energy efficiency motor driven systems [6][7].

THEORICAL FRAMEWORK

Radiation emitted the Sun can be transformed into electricity through two different types of technologies [8]:

1. Using photovoltaic panels that transform solar energy directly into electricity.
2. Using solar thermodynamics, in which are concentrated rays of the Sun at a point or a focal line using mirrors to

obtain a very high temperature which produces steam, which then becomes electricity.

Copper is the best conductor among all non-precious metals [7]; it is malleable and resistant, and therefore it has imposed itself as the ideal material in all electrical appliances: cables, plugs, generators, Motors etc. Almost 60% of the absorptive surfaces of the solar collectors are made of thin sheets of copper of about 0.2 mm. thick. Copper is also in the supply lines, pumps and photovoltaic cells (thin films technology) [9].

A solar cell is a device that converts the energy coming from the sun to electrical energy [10]. Solar cells that are used in the cottages and others are made of silicon and require much technology to build them. Although efficient solar cells have been newly available since the mid-50s, the scientific investigation of the photovoltaic effect began in 1839 [11], when the French scientist Henri Becquerel found in his discovery that electric current could be produced by incising a beam of light on certain chemical solutions [12].

A digester for organic waste or bio-digester is, in simply form, a container closed, airtight and waterproof (called reactor). Inside which organic material is deposited to ferment (excrement of animals and humans, waste vegetales-no is) (including citrus fruits since they acidify, etc) in certain dilution of water so that anaerobic fermentation produces methane gas and organic fertilizers rich in nitrogen, phosphorus, and potassium, and in addition. It will decrease the polluting potential of droppings [13], [14].

This system may also include a Chamber load and leveling of the residual water before the reactor, a device to capture and store biogas and chambers of hydrogenation and pos treatment (filter and stones, seaweed, dried, among others) to the output of the reactor [15], [16].

The phenomenon of indigestible occurs because there is a group of anaerobic bacterial microorganisms in the fecal material that, by acting on the organic waste from vegetable and animal, result a mixture of gases with high content of methane (CH₄) called biogas, which is utilized as fuel. As a result of this process are generated waste with a high degree of concentration of nutrients and Organics (ideal as fertilizer s) that can be applied to fresh, as anaerobic treatment eliminates unpleasant odours and the aument of flies [17], [18].

One of the most outstanding features of the biodigestion is to decrease the polluting potential of animal and human excrement, reducing the chemical demand of oxygen QDO and the biological demand for oxygen BOD 90% (depending on the conditions of design and operation) [19].

PROCEDURE

For the preparation of solar cell with layers of copper, the following steps were performed:

1. Cut a piece of copper size approximately (10 x 10 cm).
2. Washing the blade to remove traces of grease.
3. Clean and dry blade on the burner of the biodigester is placed as shown in the Fig 1.



Figure 1. Shows the biodigester that was used.

4. When the blade to start to warm in the biodigester, will cover of orange colors, purple and red. By increasing the temperature, these colors will disappear because a black layer of cuprous oxide was formed, as shown in the Fig.2.



Figure 2. The copper plate is observed being heated in a furnace to become a plate of cuprous oxide

5. Be left for half an hour, to achieve a thick layer of cuprous oxide, whose main property is to be a semiconductor.
6. After this time, the blade will be exhibited to the air so it cools down slowly

7. During cooling, both the cuprous oxide and copper contract, but it's done at different speeds, so rust is clear in form of flakes
8. Cut another piece of copper with equal dimensions of the first, to fold both sheets, so the two can be introduce to the plastic bottle while they touch themselves.
9. Crocodiles (connectors) are connect to each of copper sheets, clean blade to the positive terminal of the ammeter and the cover sheet with oxide cuprous to the negative terminal, as seen in the Fig 3.

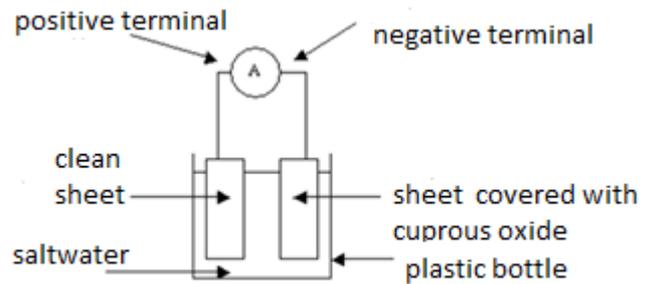


Figure 3. Diagram of the solar cell of copper foils [20].

10. Finally, add 5 grams of salt per 1 liter of water at room temperature and constant volume and mix all until it dissolved. This assembly will be expose to the sun for 1 hour (12 m o'clock) and then the current measurement will be take. This same procedure will be done for: 10,15,20,25,30,35,40,45,50,55,60,65, 70,75,80,85,90,95,100) grams of salt, as shown by the data tables in the results.

RESULTS

From the fig. 4. It's shown the generation of electric current, due to the potential difference generated to oxidize the copper foil, losing electrons and winning them the sheet of copper oxide that is reduce.

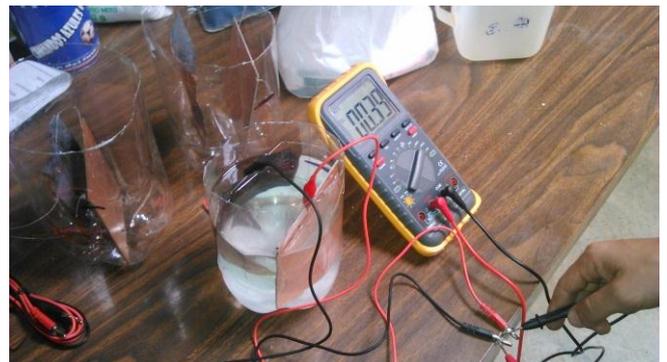
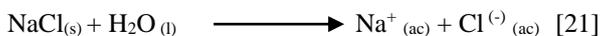


Figure 4. Mounting of the solar cell with sheets of copper and current in milliamps reading

By adding sodium chloride (NaCl, which is an ionic compound) to water, this generates a flow of electrons, because the compound dissociates into sodium ions (Na⁺) and chloride ions (Cl⁻), generating an electrolytic solution. Said solution, in which the compound is dissociated almost entirely in Na⁺ and Cl⁻ in the water solvent, constituting a strong electrolyte, can be represented as [21]:



Where the solid sodium chloride when reacting with liquid water, dissociates into positive ions Na⁺ and negative ions Cl⁻. Since the compound dissociates to a high degree, the movement of a large quantity of Na⁺ ions towards the negative electrode (-) and of the Cl⁻ ions to the positive (+) electrode, generates a large electrical conduction in the solution generating an electrolytic solution [21].

Table 1. Measures of amount of salt versus current with constant vessel volume to one liter of water, in the multimeter.

amount of salt (grams)	Electric current (mA)
10	11
15	14
20	17
25	20
30	23
35	28
40	30
45	36
50	39
55	42
60	45
65	52
70	54
75	58
80	62
85	68
90	72
95	76
100	78

From table 1. The increase in electrical energy is observed as the amount of salt increases. This is due to the decrease in water resistance due to the addition of electrolytes [22].

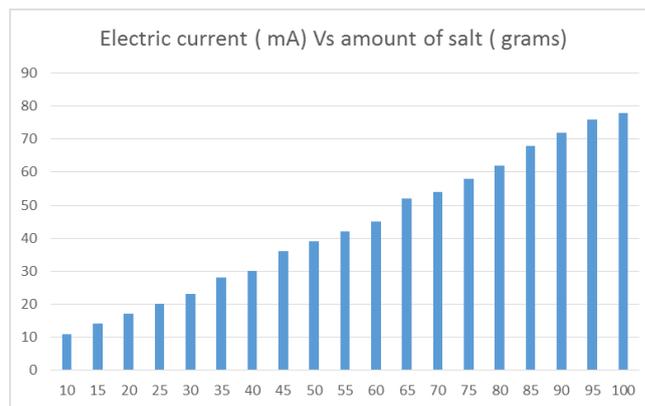


Figure 5. Increase of the electric current with respect to increasing the amount of salt in one liter of water for each case.

In the previous figure, the positive correlation of the electric current is observed when increasing the amount of salt, this due to the excellent properties of electrical conductivity that the water mixed with the salt (NaCl) possesses, when exposed to the sun, through the plates of copper and cuprous oxide, generating a potential difference between them.

CONCLUSIONS

It's concluded that the solar cell with sheets of copper made with recyclable materials generates current, this thanks to the difference potential generated to oxidize the copper foil, losing electrons and winning them the sheet of copper oxide which is reduced, using a method of heating of new copper plates, that is, through with a biodigestor.

The increasing relationship between the amounts of salt supplied to one liter of water versus electrical energy, with constant vessel volume.

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