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Experimental Results of Photo Electric Plants

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ABSTRACT: Generating electricity from soil is the most recently developed technology, which was first developed in Netherlands and generated electricity from the microbial solar cells (MSC). In this system plants absorb solar energy and use electrochemically active microorganisms in the bio Electrochemical system to generate electric current. In text context electricity can be generated by inserting aluminium and copper electrodes. This technology is cheaper and economical to everyone by which we can produce 10v current.

KEYWORDS: Electrochemical, Photosynthesis, microbial cell, electrolysis, shewanella bacteria.

I. INTRODUCTION

In day to day life there is much requirement of electricity, but now a day's electricity generation is standing on single leg task. Generating electricity is a difficult task and expensive because of less sources availability and also there is a chance of decay sources in future. To overcome this dilemma, this process was discovered.

In Netherlands David Strike along with his team have concluded that electricity can be generated from plants also. This process can avail 24x7 till the plant survives. Using this technology there will be a considerable change in world to generate electricity without polluting the atmosphere and earth sources. This technology consumes very less space considerably.

In this process, the electricity is generated by using photosynthesis and electrolysis process. This process is affordable to every sector by which they can generate their own electricity in their residence. This process can be everywhere adoptable in the world where plants grow. When this process comes into existence, then there will be cheaper electricity and becomes easy to generate electricity using less apparatus.

What is photosynthesis?

This is a process that combines water, sunlight, carbon dioxide to produce oxygen to sugar energy in chemical bonds. This is a process of making food by plants and organisms to survive but all plants do not undergo photosynthesis.

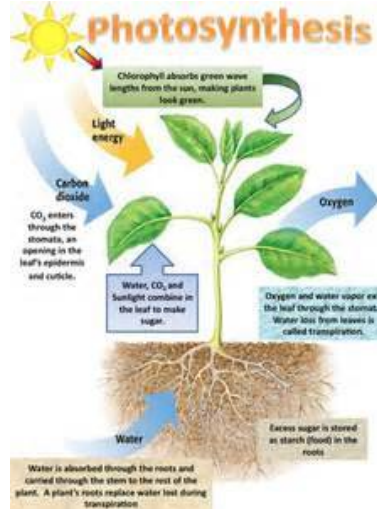
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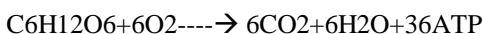
Figure 1.1 represents the process takes place in the trees



What is photosynthesis:

It is process of chemical reaction occurring directly or indirectly. For example trees produce sugar during this photosynthesis process. When trees undergo this photosynthesis process they undergo a process called respiration which consumes carbon dioxide to produce oxygen. It is a chemical reaction which need for animals and human beings to live.

The chemical reaction for photosynthesis and respiration process



The process of photosynthesis

Photosynthesis, this process takes place in the plants leaves. The leaves are made up of very tiny cells. Inside these cells are tiny structures called chloroplasts. Each chloroplast consist a green pigment called chlorophyll which gives green colour to the leaves

Chlorophyll absorbs sun's energy. It is the only energy that is used to split water molecules into hydrogen and oxygen. Oxygen is released into the atmosphere from the leaves. Hydrogen and carbon dioxide are used to form glucose or food for plants. Some of glucose is used to provide energy for the growth and development of plants while the rest is stored in leaves, roots or fruits which will be used by plants.

Here is the process in great detail:

Photosynthesis occurs in two stages commonly known as light dependent reactions and light independent reactions.

Chlorophyll and other pigments absorb energy from sunlight and this energy is transferred to photo systems which are responsible for photosynthesis.

Water provides electrons and hydrogen ions but also produces oxygen.

The electrons and hydrogen ions are used to create ATP and NADPH. ATP is an energy storage molecule and NADPH is an electron carrier/donor molecule. Both ATP and NADPH are needed in the following stage of photosynthesis.

Details about the flow of electrons through photo system 2 b6-f complex, photo system 1 and NADP reductase have not been included here but can be found under the process of photosynthesis in plants.

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Light independent reactions

Light independent reactions occur in the stroma of the chloroplasts. Although these reactions can take place without light, this process requires ATP and NADPH which were created using light in the first stage. Carbon dioxide and energy from ATP along with NADPH are used to form glucose.

More details about the formation of sugars can be found in the process of photosynthesis in plants.

WHAT IS ELECTROLYSIS?

Electrolysis refers to the decomposition of a substance by an electric current. The electrolysis of sodium and potassium hydroxides, first carried out in 1808 by Sir Humphrey Davy, led to the discovery of these two metallic elements and showed that these two hydroxides which had previously been considered as un-decomposable elements. Direct current is passed through the compound (the compound can be in molten or aqueous state).

Electrical energy (from the direct current) is changed into chemical energy (the decomposition of the compound).

One common example is the electrolysis of water, where water decomposes to hydrogen and oxygen.

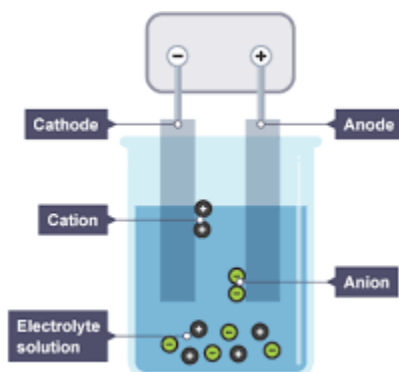


Figure 1.2 represents the electrolysis system

Main components of an electrolytic cell : Battery ,electrolytes ,electrodes.

The positive terminal of the battery is connected to the positive electrode (anode) while the negative terminal of the battery is connected to the negative electrode (cathode).

Electrolytes are usually made up of an ionic compound in solution or molten state OR aqueous solutions of acids or alkalis .

Electrolytes conduct electricity with decomposition at the electrodes as it does so.

Electrolytes can be classified into three categories: Non electrolytes ,weak electrolytes and strong electrolytes.

Strong electrolytes = lots of ions to carry the charges from one electrode to other. Examples of strong electrolytes : strong acids or alkalis (sulphuric acid, aqueous sodium hydroxide),salt solutions (aqueous sodium chloride)

Weak electrolyte = few ions to carry the charges from electrode to the other. Examples of weak electrolytes : weak acids or bases (ethanoic acid, aqueous ammonia.)

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Non electrolytes = non ions available to carry the charges from one electrode to the other.

Examples of non electrolytes: pure water , organic liquids or solvents.

Electrodes are the conductors through which electron enter and leave the electrolyte.

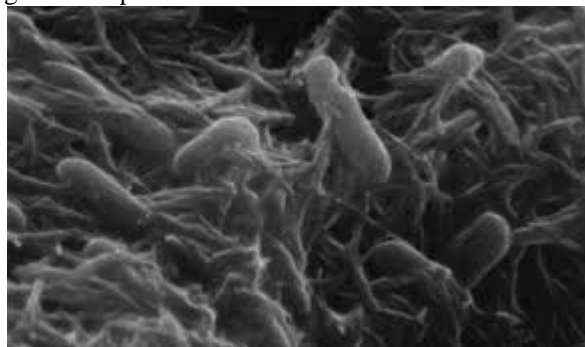
Anode is the positive (+) electrode from which electrons leave the electrolyte (or the electric current enters the electrolyte)

Cathode is negative(-) electrode from which electrons enter the electrolyte (or the electric current leaves the electrolyte)
Electrodes are typically made up of inert materials (which do not participate in any redox reactions),such as carbon ,platinum ,titanium ,or stainless steel.(Note : there some cases were the electrodes undergoes redox reactions during electrolysis.)

Usually ,every tree consists of bacteria which help for the growth of plants as well as for photosynthesis process. Top soil of the tree is packed with bacteria that generate electricity when placed in microbial fuel cells [MFC]. Because bacteria laden soil is only placed under the trees. MFC can make clean renewable electricity nearly any place around the globe.

A MFC cell is also a Known as biological fuel which is a device that can make use of microbes to generate electricity. MFC has two electrodes and has an area that separates the electrodes for an mfc to function. Electricity must flow into one electrode and leaves at another electrode.

Figure 1.5 represents the structure of shewanella bacteria



How electricity is produced from the plants Normally, by photosynthesis process plants generate some organic matter ($C_6H_{12}O_6$). This organic matter is transferred into roots. Inside the roots these organic matter is naturally is naturally divided into carbon dioxide and water and we place a membrane inside the ground. This membrane helps to divide two electrodes as anode and cathode. On the anode side the bacteria is divided into hydrogen(H^+) and electron(e^-).The electrons flows into the anode and are transferred with the help of wire . This energy can be used for flashing of led lights.

II. RELATED WORKS

MICROBIAL FUELL CELL: A microbial fuel cell (MFC) or biological fuel cell is a bio electrochemical system that drives a current by using bacteria and mimicking bacterial interactions found in nature. MFCs can be grouped into two level categories, that uses a mediator and mediator-less.

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Figure 1.5 represents the structure of mfc machine

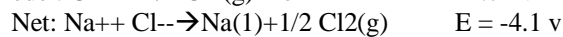
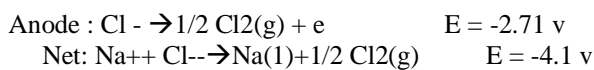
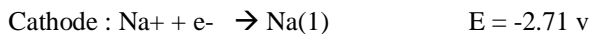


VOLTMETER: A voltmeter is an instrument used for measuring electrical potential difference between two points in an electric circuit. Analog voltmeters move a particular pointer across a scale in proportion to the voltage of the circuit; digital voltmeters give a numerical display of voltage by use of an analog to digital converter. The voltmeter in a circuit is represented by encircled 'V'.

Voltmeters are made in a wide range of styles. Instruments permanently mounted in a panel are used to monitor generators or other fixed apparatus. Portable instruments usually equipped to also measure current and resistance in the form of a multimeter are standard test instruments used in electrical and electronics accomplishments. Any measurement that can be converted to a voltage can be displayed on a meter that is suitably calibrated; for example, pressure, temperature, flow or level in a chemical process plant.

III. EXPERIMENTAL REACTION

CHEMICAL REACTION



What happens during electrolysis?

Negative ions (Anions) are attracted to the anode while the positive ions (cations) are attracted to the cathode.

When the ions reach their respective electrodes, they will be discharged. (They lose or gain electrons and form neutral atoms)

Hence, at anode, anions are discharged through loss of electrons; while at cathode cations are discharged through gain of electrons.

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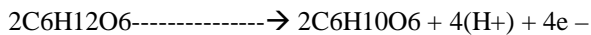
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How can we generate electricity by photosynthesis?



By photosynthesis we can generate electricity up to 0.1v normally. But by using another technique we can generate up to 10v.

Drove a copper rod(cathode) into tree until it touches the pith. Then dig a two feet hole just below the tree and fix the electrode at one end of root and pour water. Then we will get 10v electricity. Electricity is generated by electrolysis and photosynthesis process.

Electricity is produced is produced by attraction negative and positive electrons. Here we are placing two positive electrodes even though we are getting electricity. The reason behind that is, when electrons are released from the tree, they are attracted towards electrode and the electrode becomes negative. Thus one of the two positive electrodes is converted as negative. so the rupture of positive and negative electrons takes place.



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IV. CONCLUSION

The generation of electricity from plants produces no green house gases, toxic waste and particulate matter. The dream is that we are generating electricity in any suitable wetland or wet area – including rice paddy fields, mangroves and salt marshes, which takes us to some of the most remote and impoverished parts of the world. It is in these off-grid communities that we believe in that the technology can make a real difference to people's lives. The disadvantage of solar power is that the sun cannot be for 24 hours in a day. When the sun sets or on a cloudy day, the solar PV panels stop producing electricity. If we need electricity at that circumstance, we have to get through some other sources and wind energy cannot be used all the time as there is a complexity of the area where should it be placed. As some of the renewable energy sources has some disadvantages, but electricity from plants is not temporary and will exist forever. Due to this afforestation will be increased. Since all this equipment is covered, there will be no effect by rains. Pollution will be minimum and greenery in the environment increases.

Closed MSCs can preserve nutrients for the organism which can result in long term low maintenance power production. Integrated PMFCs can add value to other applications, such as greenhouses with the food or flower production, or rice paddy fields with rice production. In addition of waste water and surface water treatments can be integrated into PMFCs to supply extra organic matter for energy production. In real life MSCs need to compete with other renewable energy systems. Several factors such as energy yield and constant environmental benefits will all influence of outcome this completion.

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