IMPLEMENTATION OF POWER PLANT USING SALT WATER AS ELECTROLYTE

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ABSTRACT

On this earth consists of 97.5% salt water and 2.5% fresh water. There are 1,365,000,000 km³ of sea water around the world, so salt water is easily available and very abundant. Salt water has many benefits for human survival, one of the benefits that has recently been used from salt water is to generate electrical energy. Salt is an ionic compound consisting of positive ions and negative ions. Salt solution in water is an electrolyte solution which is a solution that can conduct electrical current. Therefore, salt water can be used as an alternative energy source as a medium used to produce electrical energy sources.

This paper discusses how the salt water media process can produce electrical currents. This experiment uses iron (Fe) and zinc (Zn) electrodes. With the working principle of electrochemical cell reaction, namely galvani cells consisting of two electrodes and electrolytes. This electrode is connected by a conductor that can transport electrons into the cell or outside the cell. Generally between the two electrodes in the electrochemical cell there is a measurable potential difference. This experiment can determine the voltage and the ability of cells to produce electrical energy by reacting salt water with Fe and Zn electrodes.

Keywords: electric, electrochemical, galvani cell, electrode, salt water

1. INTRODUCTION

Salt water can be used as an alternative energy source as a medium used to produce electrical energy sources. In addition, the medium of salt water is also rarely used as a medium capable of generating electrical energy. As what Sastroamidjojo have done, he drained 2 liters of Parangtritis seawater to the anode circuit and the cathode in the form of graphite and zinc. The experiment was able to produce electricity with a voltage of 1.6 volts. Salt is an ionic compound consisting of positive ions and negative ions. Salt solution in water is an electrolyte solution which is a solution that can conduct electrical current. Therefore, salt water can be used as an alternative energy source as a medium used to produce electrical energy sources.

This experiment was conducted an research and implement electrical plants that use salt water as a natural energy source to produce electricity. This experiment was carried out using the working principle of electrochemical cells namely galvani cells. The implementation is a simple simulation using 10 plastic cups which in each glass there are two different electrodes that are in series from one glass to another.
2. ENGINEERING LEARNING

a. Electric

Electrically or commonly referred to as electricity is one form of energy. Electricity is an electron flow. Electricity is used to do many things for humans ranging from lighting and heating or cooling our homes, as a resource for television and computers. Electricity is controlled of energy used in the application of heat, light and strength.

b. Salt Water

Salt is a compound formed from the reaction between acids and bases. Salt is a compound produced from neutralization reactions between acidic solutions and alkaline solutions. Salt according to chemistry is an ionic compound which is formed from a result of acids and bases with components consisting of positive ions (cations) and negative ions (anions) to form a neutral compound. The various types of salt ions are important that compound must have a zero overall electrical charge.

c. Electrochemistry

Electrochemistry is part of chemistry that studies the relationship between chemical reactions and electric currents. Electrochemistry can be applied in a variety of human purposes, such as daily needs on a household scale and large industries such as industries that produce chemicals both organic and inorganic, pharmaceutical, polymer, automotive, jewelry, mining, waste treatment and analytical fields.

d. Electrochemistry Cell

Electrochemical cells can be defined as a system consisting of two separate electrodes at least by one type of electrolyte phase. Two electrodes in the electrochemical cell there are a measured potential difference. Electrochemical cells can be classified as galvani cells, electrolysis cells and voltaic cells. In this study using the working principle of galvani cells.

Galvani cells are cells that produce electric current. In galvani cells, the anode functions as a negatively charged electrode and the cathode is positively charged. Electric current flows from the cathode to the anode. Chemical reactions that occur in galvani cells occur spontaneously. One of the applications of galvani cells is the use of Zn / Ag2O3 cells for clock batteries.

3. METHODOLOGY

a. Research Phase

ii. Make an Experiment Tool

The tools use 10 plastic cups arranged on shelves made of wood. In each glass there are 2 electrodes Zn and Fe, that are placed separately in 1 glass. In each glass, the electrode is connected in series using a jumper.
iii. **Do an Experiment**

Plastic cups containing salt water up to 1 cm before the glass surface limit. Half of each electrode is immersed in water and the rest is covered by a jumper on another glass electrode with the Zn condition connected to the Fe and at the other end of the connected electrode connected to the LED light and a voltage measuring device in parallel.

iv. **Conclude the Results of The Experiment**

After conducting the experiment data analysis was carried out and drawing conclusions. This experiment shows voltage value generated and time of LED can turn on.

v. **Block Diagram of The Electric Generator System Uses Salt Water**

![Diagram of the Electric Generator System](image)

Figure 1: Diagram block system of power plant using salt water

Ten containers of each container containing Fe and Zn electrodes which are half the surface are submerged in salt water, connected in series. The LED lamp is connected in parallel to the end of the electrode connected in series. Then the voltage is measured using a multimeter in parallel on an LED lamp.

vi. **Research Phase Flowchart**

![Flowchart of Research Phase](image)

Figure 2: Flowchart research phase
Figure 2 shows the flow of experiments conducted during the study starting from the study of literature, namely in determining the problems that will arise, problem boundaries, theoretical basis and preparing tools and materials. After that the experiment was carried out and analyzed the results of the experiment until finally it could draw conclusions from the results of the analysis.

4. RESULTS

4.1. Experimental Results Data

In the experiments that have been done as shown in Figure 3. the results obtained can be seen in table 1.

![Figure 3: trial series of power plant using salt water](image)

Ten containers of each container containing Fe and Zn electrodes which are half the surface are submerged in salt water, connected in series. Electrode connected to the LED light and a voltage measuring device in parallel.

**Table 1: Experimental results data**

<table>
<thead>
<tr>
<th>Time</th>
<th>Voltages (V)</th>
<th>LED conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>1.8</td>
<td>Very Bright</td>
</tr>
<tr>
<td>Day 2</td>
<td>1.8</td>
<td>Very Bright</td>
</tr>
<tr>
<td>Day 3</td>
<td>1.7</td>
<td>Very Bright</td>
</tr>
<tr>
<td>Day 4</td>
<td>1.7</td>
<td>Very Bright</td>
</tr>
<tr>
<td>Day 5</td>
<td>1.6</td>
<td>Bright</td>
</tr>
<tr>
<td>Day 6</td>
<td>1.6</td>
<td>Bright</td>
</tr>
<tr>
<td>Day 7</td>
<td>1.5</td>
<td>Bright</td>
</tr>
<tr>
<td>Day 8</td>
<td>1.5</td>
<td>Bright</td>
</tr>
<tr>
<td>Day 9</td>
<td>1.4</td>
<td>Bright</td>
</tr>
<tr>
<td>Day 10</td>
<td>1.4</td>
<td>Bright</td>
</tr>
<tr>
<td>Day 11</td>
<td>1.3</td>
<td>Dim</td>
</tr>
<tr>
<td>Day 12</td>
<td>1.1</td>
<td>Dim</td>
</tr>
<tr>
<td>Day 13</td>
<td>0.8</td>
<td>Very Dim</td>
</tr>
</tbody>
</table>
The table above shows the results of the study which data was taken for 2 weeks (when the LED was off). voltage measurement using an electric measuring instrument that is a multimeter.

4.2. Analysis of Experimental Results

Data analysis in the experiments conducted is knowing how Zn and Fe electrodes arranged in series can produce electrical energy. In table 1 shows that brine and Fe and Zn electrodes are installed in series, can ignite an LED lamp and produce a voltage of 0.2 volts to 1.8 volts. This circuit is able to produce electricity for 14 days with a voltage that is getting less and less.

5. CONCLUSION

Based on the data that has been obtained, the results of this experiment can be summarized as follows:

5.1.1. Zn and Fe electrodes in brine that are arranged in series can produce electrical energy with a voltage of 1.8 volts.

5.1.2. The electrical energy produced can turn on the LED for 14 days.

6. CITATIONS AND REFERENCES


