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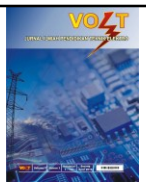

UTILIZATION OF SEA WATER AS SOURCE OF ELECTRICAL ENERGY OF COASTAL PEOPLE

Andri Kapuji Kaharian[1]✉, Nani Sofroh[1], Didik Aribowo[2]

[1]Department of Computer System, Faculty of Information Technology
Universitas Serang Raya, Serang 42117, Indonesia
✉Corresponding author e-mail: aka.campus@gmail.com

[2]Department of Electrical Engineering Vocational Education, Faculty of Teacher Training and Education
Universitas Sultan Ageng Tirtayasa, Serang 42117, Indonesia
e-mail: d_aribowo@untirta.ac.id

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Abstract

In this modern era electricity needs have a huge surge. It can even be said that humans are very dependent on electrical energy. Power outages, disturbing public activities, disrupted traffic flows and even wider relationships between countries can also be affected due to power outages. For that need to be developed alternative energy sources. One of the most untapped ones is the energy of seawater. The energy generated from seawater has advantages, such as environmental friendliness, and does not require much funding. one sign that seawater contains electric current is the presence of a high element of Sodium Chloride (NaCl) and by H_2O is decomposed into Na^+ and Cl^-. With the free charge particle, there is an electric current. Has been done research about sea water that is able to generate electrical energy, where seawater is a compound of NaCl, sea water is a solution of electrolyte with biggest solute. From the results of research conducted that the stress contained in 200 ml of sea water obtained 0,5V, and when added 50 grams of salt voltage increased to 0.8V. By researching the conversion of alternative energy, sea water to generate electricity can help supply electricity from the government to meet the electricity needs in coastal areas.

Kata kunci: memuat kata-kata pokok, terdiri dari tiga – lima kata (ditulis urut secara alphabetic)

INTRODUCTION

The seashore and the sea situated in Banten Bay northern coast of the island of

Java, about 60 km west of Jakarta. Administratively, the coastal areas and the sea waters of Banten Province has an area of 11,134.22 km^2, with 509 km long coastline, as well as 55 tiny islands and outlying island save the wealth and diversity of coastal and marine resources (Wisha, Husrin, Prihantono, 2015).

Territorial boundaries of the coastal areas and the sea in this research are set based on planning zone. This boundaries includes the whole area of land (upstream) and the sea (downstream), where there is human activity (development) that can significantly impact on the environment, coastal and marine resources. Because there hasn't been the utilization of alternative energy resources that could potentially be developed as an energy source for power plants, then the focus of the research is to make use of seawater as a source of electrical power for communities in coastal areas (Maesaroh, Barus, Iman, 2016).

The energy crisis has become a problem that continues to go on in Indonesia and other countries. Energy demand will continue to increase along with the advancement of technology and the increase of population. Utilization of sea water is very useful to overcome the energy crisis that hit various countries. There are several ways to utilize sea water, not only as a source of electrical energy, but it can be used as food ingredients (Kholiq, 2015).

Energy problems for the survival of human beings is a major problem faced by almost all countries in the world. This energy crisis triggered from human population growth globally and the development of new technologies that require electrical energy to conduct a performance assessment. Fossil fuels especially petroleum is still the primary energy consumption. Research on alternative fuels replacement of fossil fuels continue to do. The parameters of the success of this alternative fuel is renewable (renewable energy), environment-friendly, and low cost (Kholiq, 2015).

Consumption of the world against the increasing electrical energy over rapid electrochemical technology. An interesting alternative comes from the fuel cell, which is expected to produce electricity with high efficiency and minimal environmental disturbance. (Hsu, Nathanson, Hoag, Comoration, 1994).

Fuel cells use a chemical reaction, better than combustion engines, to produce electrical energy. The term fuel cell is often devoted to the hydrogen-oxygen fuel cell. The process is the opposite of electrolysis. In electrolysis, electric current is used to reduce the water into hydrogen and oxygen. By reversing this process, hydrogen and oxygen is reacted in a fuel cell to produce water and electricity (Hsu, Nathanson, Hoag, Comoration, 1994).

Fuel cell energy conversion is usually more efficient than other types of energy converters. Energy conversion efficiency can be achieved up to 60 – 80%. Another advantage of fuel cell is able to supply electrical energy in quite a long time. Unlike the battery was only able to contain materials of limited fuel, the fuel cell can be continuously replenished fuel (hydrogen) and oxygen from outside sources. Fuel cell is an environmentally friendly source of energy because it does not cause any pollutants and truly can be used if there is a continuous supply of hydrogen derived from natural resources (renewable resource).

METHOD

The methods used in this research is a method of electrolysis. In a fuel cell progress of electrochemical processes are reversible (tog-

gle). What is meant by an electrochemical process i.e. reversible fuel cell inside when used chemical conversion process takes place into electric power. As for the tools and materials used are: 1) the sea water; 2) salt; 3) cable; 4) voltmeter; 5) aqueous glasses; 6) copper plates; and 7) platinum wire.

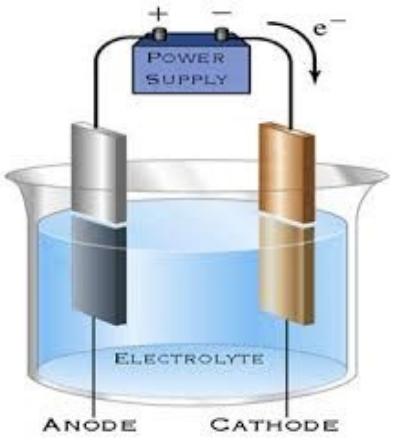

Figure 1. Volta cell

With regard to the sequence of research written into the shape of the diagram as follows:

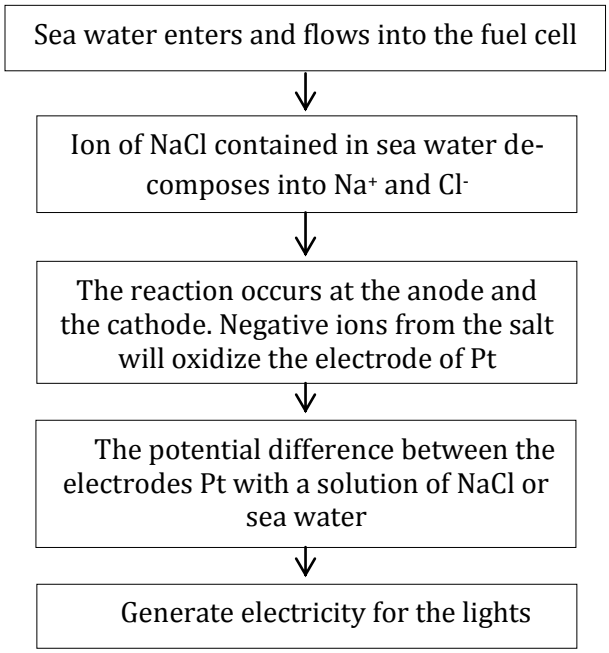

Figure 2. Fuel Cell Flow Chart

RESULTS AND DISCUSSION

Sea water has salt levels on average 3.5%, meaning that in 1 liter (1000 mL) sea water there is 35 grams of salt. Marine energy is a renewable energy alternatives including non-biological resources which have great potential to be developed. In addition to being a source of food, the Sea also contains diverse energy resource whose existence is increasingly significant, whereas the energy derived from fossil fuels are depleting.

From the research that has been done on the get results that each 200 ml of sea water will produce 0.5V and when added as much as 50 grams of salt then the voltage increases to 0.8 V

Table 1. The Experiment Results

Experiment	Sea Water (ml)	Salt (gr)	Voltage (V)
1	200 ml	-	0.5 V
2	200 ml	50 gr	0.8 V

In a fuel cell, oxidation reactions occur at the anode and reduction reaction occurs at the cathode. Oxidation reactions produce electrons flowed toward the cathode through an external circuit. Be the perfect circuit with positive ion movements through electrolyte toward the cathode space.

Conventional fuel cells operate by using a simple inorganic chemicals, such as hydrogen and methanol (MeOH), and produce energy, water, and carbon dioxide (in the case of methanol).

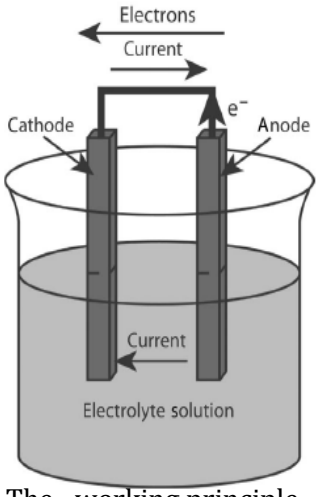

Figure 3. The working principle of fuel cell (Mench, 2008)

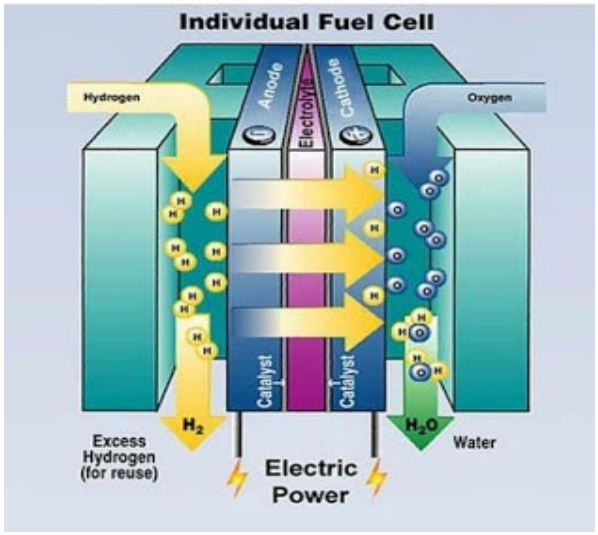

Figure 4. Fuel cell scheme

Fuel cell types can be seen in table 2:

Table 2. Type of fuel cell

Tipe *Fuel cell*	Ion	Suhu Operasi (°C)
Alkalin (AFC)	OH^-	50-200
Proton exchange membran (PEMFC)	H	50-100
Phosphoric acid (PAFC)	H	220
Molten carbonat (MCFC)	CO_3^{2-}	650
Solid oxide (SOFC)	O^{2-}	500-1000

The working principle of fuel cell hydrogen within the cell that is streamed toward the side of the anode while oxygen in air is channeled towards the cathode side. The separation occurs at the anode, hydrogen into an electron and a proton (hydrogen ion). Hydrogen ions are then cross and meet up with oxygen and electrons at the cathode and produces water. The electrons that contain electric charges is going towards the cathode through the external network. The flow of electrons is what will generate an electrical current.

Fuel cell has several advantages, namely have high efiesiensi (60%-70%), eco-friendly (no noisy, low-emission) and theoretically, waste or emissions produced is water (H2O) (Mench, 2008).

Unlike the regular burning in the engines, where the waste is produced is the gases that can potentially pollute the environment. In addition if you use the conventional power plant pollution, noise can also occur while this fuel cells don't produce sound. Fuel cells do not require electrolyte replacement and replenishment of fuel, but if its fuel runs out, then these cells also may not work.

Research has been done about the utilization of seawater as a source of electrical energy for mengasilkan voltage by using seawater as a source of electrical energy and the cathode plate (copper) and anode (zinc) as the conduction current

The results of the research that has been done, that a pair of the plates are immersed in sea water will produce a voltage of 0.5 – 1 volt. Sea water does not affect the voltage, but the series made in series on the order sheet that can magnify the voltage and

wide slab with the abundance of water used is also not affect voltage. So to turn on the lights of 1.5 volts needed 2 pairs of oppositely arranged sacara series in order to offset those needs.

The energy of the sea water is utilized to provide electricity at the coastal region and for the whole area which still need electricity. If the energy of sea water can be developed in Indonesia, then Indonesia can save energy because most areas of Indonesia are aquatic (sea). The source of the energy that comes from fossils of each moment will soon be thinning. Thus the energy of sea water big enough it includes energy efficient as well as alternative energy can be utilized and developed.

CONCLUSION

The more the content of salt contained in the water of the sea then the higher the electricity generated. For this research, the author uses only 4 types of metals: Aluminum, copper, Platinum, and zinc. Any type of metal, has a value of voltage which varies

The benefits of this research i.e., supplies electricity to coastal areas much easier, because with the use of sea water.

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