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RESEARCH ARTICLE

DESALINATION USING ACTIVATED CARBON FROM MANGROVE ROOTS.

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Abstract

Timor-leste is located on the seafont, coastal communities take the water for their daily needs derived from seawater. It needs some treatment for sea water into fresh water. Water treatment selected is activated carbon from mangrove roots. Research method using carbonization and activation process. Activation using HCl dan H₂SO₄. The result areis the biggest worth of chloride levels decrease 15.3% using activated carbon mangrove roots with the activation of H₂SO₄.

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Introduction:-

Most of population on the coastal area in Timor Leste needs fresh water. About 40% people is lack fresh water because there is no water treatment for salt water. People in coastal area recieve clean water from deep wells and but the distribution water is not enough. Some technologies have been made to treat salt water to fresh water. As we all know that salt water is very abundant in coastal area, but the quality ofwater contain is high salt, it cant be used for the water needs of communities. We often hear when dry season coastal communities began to shotage water. Rainwater is one of source of water wich is prepared to increase water needs of communities. Rainwater that has been prepared in reservoir is not often sufficient in dry season. In the era industrialization, population and socio-economic increase rapidly. it resulted in the basic human needs especially for clean water increases.The demand for clean water supply is increasing while the water resources in nature is very limited, make the enhancement of efficiency for water treatment as the main requirement. To solve the problem of fresh water supply in coastal areas, one of the technology to treat salt water become fresh water is using desalination.

Literature Review:-

Seawater contains various of salts. In the tropical area wich has high rainfall, seawater containing 3.5% of salinity.

There are some physical properties of water such as:

Temperature:-

Temperature of seawater depends on high threshold salinity separates open liquid. Sea water temperature changes because of heat transfer from one mass to another mass. Heat transfers because of radiation from space and sun, heat conduction of atmospheric and condensation of water vapor. While decreasing of seawater surfaces temperature because of radiaion turning seawater into the atmosphere, through conduction heat into the atmosphere, and evaporation. The sun has the greatest effect in changes sea surface temperatures and variations of temperature change is influenced by the geographical position of waters.

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Salinity:-

Salinity is the total amount of dissolved material (expressed in grams) contained in 1 kg of seawater, salinity unit: 0/00 (per mille). Salinity is concentration of salts or dissolved salts in water. Salinity can also refer to the salt content in the soil. Mostly the salt content in most lakes, river, and fresh water.

Density:-

Density is a direct function of the depth of the sea, and are also affected by salinity, temperature, and pressure. The density of sea water is amount of seawater per unit volume.

Physical and chemical characteristics of sea water:-

The chemical composition of river water same with the composition of sea water. In fresh water, dissolved salts are generally composed of salt carbonate (CO_3) and salt bicarbonate (HCO_3) from metals such as Ca, Mg, Na, K. Compare it with sea water, the chemical elements that exist in freshwater fewer in number and more simple. In seawater, mostly consisting of ($\pm 96.5\%$) and an average of 3.5% (= 35%) is a component of dissolved inorganic.

Adsorbent:-

The adsorbent is a solid substance that can adsorb fluid particles in a process adsorption. The adsorbent is specific and made from porous materials. The adsorbent is specific and made of porous materials. Selection of the type of adsorbent in the adsorption process should be tailored to the nature and circumstances of the substance to be adsorbed and commercial value. In general the type of adsorbent divided into two, that is:

1. Polar Adsorbent:-

The types of polar adsorbent also called hydrophilic are silica gel, activated alumina, and zeolite.

2. Non-polar Adsorbent:-

The types of non-polar adsorbent also called hydrophobic are polymer adsorbent and activated carbon.

Mangroves:-

Normally, *Rhizophora mucronata* grows in shoreline that flooded tide, although sometimes grows in the coast. In good environment, *Rhizophora mucronata* reached 3.5 meter high that can be used as firewood and the charcoal produced is good quality because it has a high calorific value of around 4,400 kcal / kg - 7,300 kcal / kg (FAO, 1994). *Rhizophora sp.* has air roots grow well, number of arches roots are influenced by the location of the tree, young bark is gray and has a cell nucleus, rugged and easy to peel, usually used to dye. For family *Rhizophoraceae* has the largest leaf size. upper leaves are glossy green to yellow-green. Leaf length between 13 cm to 23 cm and width of leaves between 6 cm to 12 cm. The leaves are oval and tapered with a length of 5-7 mm there are black dots on the lower surface of old leaves (Willemsen et al., 2016). The flower of this plant form a group, about 4-16 pairs, the length of 14-16 mm, width 7-9 mm, the colour is yellow-green when young, the colour of bud is ivory, number of petals is 4, furry, stamens is short between 1-2 mm. On the flower there are fruit with length about 6 cm to 8 cm and width about 2 cm to 3 cm. *Rhizophoraceae's* seed is very large as long as 90 cm, it has sharp ends and short. Seed rarely are when fell to the ground.



Figure 1:- Mangroves

Result And Discussion:-

in the adsorbtion process using activated carbon adsorbent of mangrove roots with HCl activation or H₂SO₄ materials would also decreased levels of chloride. The largest decreasing chloride levels in the seawater using 100g adsorbent with H₂SO₄ as activation materials. This is because the dose of adsorbent used is much and mangrove roots are able to adsorb seawater then the salt levels in the processing of the adsorbent of mangrove roots are able to absorb chloride levels in seawater.

Based on the chart figure 2, it can be seen that the material of activated carbon H₂SO₄ activation is more effective in decreasing the levels of chloride becuase H₂SO₄ is acidic then able to absorb chloride levels up to 15.3% .mangrove root able to absorb nutrient (De-León-Herrera et al., 2015)

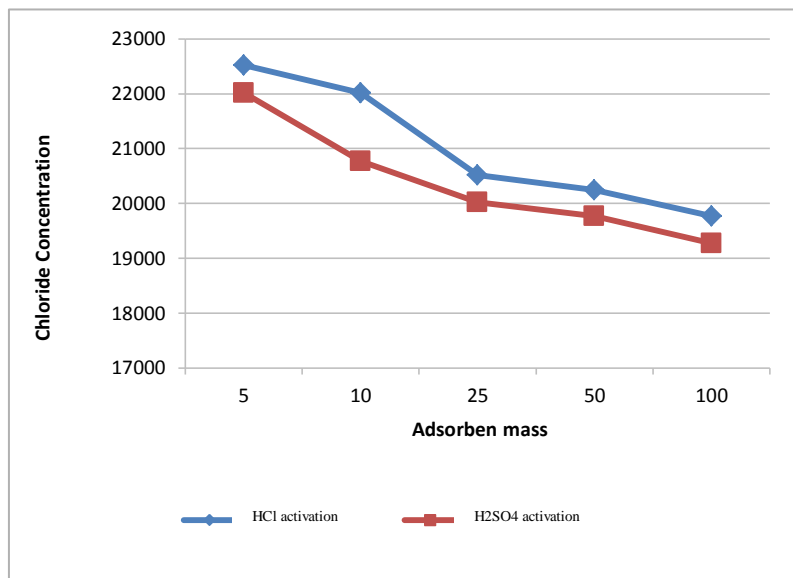


Figure 2:- Adsorbant Dose For Removal Chloride

By the analysis it can be concluded that both of ingredients of activation of activated carbon from mangrove roots can reduce chloride levels in the sea water.

According to the Government Regulation of Surabaya No. 02 of 2004 about the criteria for water quality based on the classification of water, sea water treatment by adsorption using the adsorbent material from mangrove roots and activation of H_2SO_4 and HCl material capable to produce water that is included in class III. Desalination that have conduct are multi stage flash evaporator, solar desalination, freeze concentrator technology, and nanofiltration (Alishiri. M and Tayyebi. S. 2014; Gorjian. S and Ghobadin. B, 2015; Williams P.M *et al.*, 2015; Kaya, C et al., 2015). According to Phuntso. S, 2012 describe that temperature influence to desalination. Small pores in filter media give main role for absorbing pollutant (Kusuma et al., 2016). fresh water demand needed by all people who lived in side of sea that why need some cheap treatment for that and save energy (Kabeel dan El-said, 2014; He dan Yan, 2009). activated carbon using root mangrove can be another solution for cheap, save energy and warmless, someday can change pattern and behaviour of people who lived in side of the sea (Hadad, 2013; Lukic et al, 2010)

Conclusion:-

Mangrove roots are processed into activated carbon can be used as an adsorbent for desalination of seawater into fresh water through the adsorption process. The largest decrease of chloride levels is 15.3% using activated carbon from mangrove roots with activation of H_2SO_4 .

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