Benefits of Silica (SiO2) Compound on Rice Husk Briquettes as Adsorbent of Sea Water on Clean Water

Humayatul Ummah Syarif
Electrical Engiinering ,Fajar University
Makassar, Indonesia
humayatulu@yahoo.com

***Abstract*— The rice production ranks third of all cereals in world, after maize and wheat. However, the rice is the main carbohydrate source for the majority of the world population. Methods of research that will be done are to look at the silica composition of rice husk briquettes that can be utilized. The chemical composition can in see by using method *Scanning Electron Microscope* (SEM). The chemical composition of rice husk briquettes studied were rice husk briquettes before being used as adsorbent and after is used as adsorbents at the distillation process. The chemical composition of rice husk obtained after the process comparing to before the process of distillation using Scanning Electron Microscope (SEM). Rice husk briquettes made with a size 12 cm a have density is 1,537 kg/m3. Results of the study of chemical elements by looking at the chemical composition of rice husk charcoal, shows that the compound silica (SiO2) husk has a value of 96.74% composition. The distillation process proved that the silica contained in rice husk briquettes can be used for the distillation of sea water into clean water.**

Keywords*— *Distillation, Briquettes Absorber, Rice Husk, Clean Water

I. INTRODUCTION

The rice production ranks third of all cereals in world, after maize and wheat. However, the rice is the main carbohydrate source for the majority of the world population. The product results of processing paddy called rice husk. Rice husk is used as absorber in seawater distillation process into clean water. For that we need a clean water supply and quality of drinking water and do not endanger the public. Given the abundance of the seawater resources may be obtained, as raw material for process distillation. The processing desalination processes of seawater into clean water, using adsorbent from rice husk briquettes. The product results of processing paddy called rice husk. Rice husk is used as absorber in seawater distillation process into clean water. For that we need a clean water supply and quality of drinking water and do not endanger the public. The seawater resources an abundance of easily obtained as raw material for process distillation. The processing desalination processes of seawater into clean water, using adsorbent from rice husk briquettes. The purpose of this study was to analyze the chemical and physical composition of rice husk which has been burned and made into briquettes. The distillation process is done with the help of sunlight to make sea water into clean water.

Research purposes can be expressed as follows:

1. The rice husk made the rice husk briquettes with a size 12 cm.
2. Analyzing the chemical composition of briquette of rice husk with use SEM for the distillation sea water process into clean water

II. MATERIAL BRIQUETTING OF RICE HUSKS

Table 1 Material the made briquetting of rice husks

No.	Volume (cm^3)	weight, m (gram)			
		Rice husk	Sago	Water	Clay
1.	20 x 20 x 8	1200	200	3000	1000
2.	20 x 20 x 10	1500	200	3000	1000
3.	20 x 20 x 12	1800	200	3000	1000

These three variables are treated the same as thickness the variable, t1, t2, t3 to the total weight of rice husk different.

Table 2 the chemical composition of rice husk the result of burning amorphous

Element	unn. C [wt.%]	norm. C [wt.%]	Atom. C [at.%]	Compound norm	Comp. C Error [wt.%]	(3 Sigma) [wt.%]
Oxygen	34.78	52.51	66.11		0.00	20.22
Silicon	29.95	45.22	32.44	SiO2	96.74	4.25
Aluminium	0.29	0.44	0.33	Al2O3	0.83	0.23
Sodium	0.28	0.42	0.37	Na2O	0.56	0.29
Magnesium	0.02	0.04	0.03	MgO	0.06	0.12
Potassium	0.56	0.85	0.44	K2O	1.02	0.31
Calcium	0.11	0.16	0.08	CaO	0.22	0.18
Titanium	0.04	0.07	0.03	TiO2	0.11	0.15
Phosphorus	0.07	0.11	0.07	P2O5	0.26	0.16
Chlorine	0.13	0.19	0.11		0.19	0.18

Scope and Limitations Problems

The scope of the study can be expressed as follows:
This study aims to determine how much density is expected in a made briquette of rice husk, the process of distillation of sea water into clean water, and briquettes rice husk as adsorbent. How the value of heat conductivity and composition of rice husk briquettes [3].

1.1. Results Table 2 shows that the value of rice husk silica chemical composition is 96.74%.Construction of references

Rice husks (grain leather) are the result of grinding or grain build-up. Globally, about 600 million tons of paddy rice is produced annually. The rha was obtained by burning rice husk, an agro-waste material which is abundantly available in the developing countries. A total of 200 test specimens were cast and tested at 3, 7, 28 and 150 days. By [1]. The surface area of ZSM-5 zeolite (without template)/porous carbon composite is 485.4 m^2/g, and this composite has both microspores and mesopores. [2]. Combustion efficiency in all test runs was higher than 97%. [3]. approximately 20% of the weight of the rice is rice husk, and varies from 13 to 29% of the composition is the chaff husk ash that is always generated whenever the burnt husk [4]. In Indonesia, in particular the southern Sulawesi, rice hulls typically accumulate and just being around the rice mill effluents. Utilization is still very limited, results the burning of rice husk ash is usually used as cleaning equipment for household and used to dry the bricks in the places of manufacture of tiles and bricks. The composition of Si compound after undergoing a process of distillation is used as the absorber was experiencing a decline in value of Si = 30.48 m/m% (before the distillation process) turn into Si = 22:27 m/m%. (after the distillation process) [5].

The terms of Chemical: clean water should not contain chemicals in an amount that exceeds the limit. Some chemical requirements include: pH, total solid, organic substances, CO_2 aggressive, hardness, calcium (Ca), iron (Fe), manganese (Mn), copper (Cu), zinc (Zn), chloride (Cl), nitrite , fluoride (F), as well as heavy metals.

1. The terms of bacteriological and microbiological: Clean water should not contain bacteria and parasitic pathogens that damage the health. Bacteriological requirements are characterized by the absence of the bacteria E. coli or fecal coli in the water.
2. The terms of Radiological: Requirements radiological requires that clean water should not contain substances that produce materials containing radioactive, such as alpha rays, beta and gamma.
3. Sea water contains dissolved ions is greater than freshwater. Ions whose existence is abundant in sea water are sodium, chloride, magnesium, sulphate, and calcium.
4. The content of chemical elements in sea water: Cloride (Cl), sodium (Na), magnesium (Mg), sulfur (S), calium (Ca), Calcium (K), bromine (Br), Carbon (C), Cr, B . While the content of chemical elements in clean water: calcium, iron, lead, magnesium, copper, sodium, chloride, and chlorine .

2.1 Study Design

Study design the rice husks briquette.
The rice husks is taken from the rice husks mill, then burned into charcoal husk and mixed with clay and given adhesive sago. Then here molded into rice husks briquettes to be used as adsorbent.

Fig.1. Process of making rice husks briquette

III. METHOD RESEARCH

Rice husk is obtained in an agricultural area in Maros, South Sulawesi Province, Indonesia. Rice husk plant this, the obtainable from milling rice, then burned made in

as charcoal. After becoming charcoal, then it mixed with clay and starch to be used as briquettes. Rectangular shaped briquettes with size (20x20x12) cm, which is the absorber. Briquettes were mixed and then researched in laboratory by using Scanning Electron Microscope (SEM). A briquette is an absorber to make of sea water into clean water. The water produced will be tested chemical and physical properties. A compound rice husks, before and after use as an adsorbent has been investigated by SEM can be shown on the figure 2. process produces sea water into fresh water. In the process distillation wherein rice husk briquettes produce larger density, resulting more produce the clean water, see figure 3.

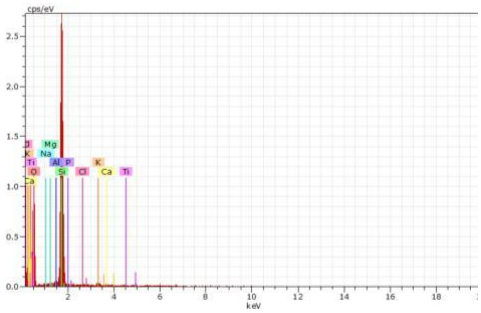

Fig. 2 Composition Rice Husk

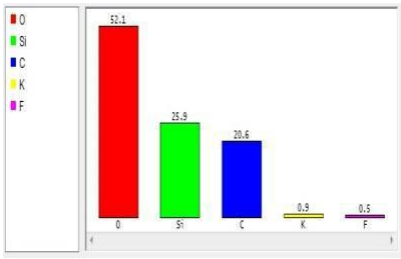

Fig. 3 Graphic elements of compound Rice husk.

3.3 The process distillation

The picture 4, shows how the rice husks briquettes are used as adsorbents in distillation the process. The distillation

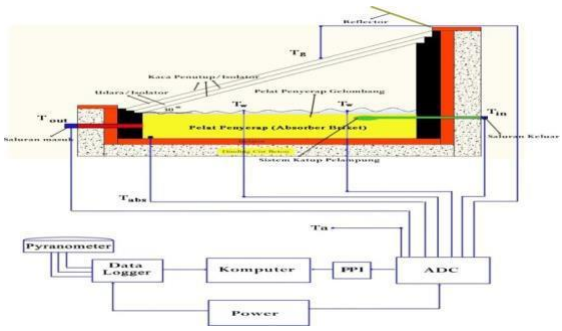

Fig. 4 Process distillation

In the manufacture of these briquettes, are clay and starch to heavy be the variables the constant. The calculation result obtained density value ( ), using the formula:

$$\rho = \frac{m}{V} \quad (1)$$

where: = Density (kg/m^3)
m = massa (kg)
v = Volume (m^3)

The example: to think t1 = 8 cm.

- Weight rice husk of = 1200 grams
- Weight the sago = 200 grams
- weight the clay = 1000 grams
- Water = 3000 cm^3 = 3000 grams

So the amount of weight gained is 5400 grams.

IV. RESULTS AND DISCUSSION

Results Table 1 shows that the good results of the density is density value large enough, ie greater than 1 g/cm^3. Where the density is said to be a good value is greater than the value of the specific gravity of water is 1 g/cm^3. Results obtained from the third the thickness of briquette, the thickness of 8 cm (t_1) and a thickness of 12 cm (t_3) resulting density ( ) is still greater than the thickness of 10 cm (t_2) which generates a density of 1.1 g/cm^3 after on tap and after be dried, of density to 0.99 g/cm^3. The result is thickness (t_3) 12 cm to have density of good is 1,537 kg/m^3.

The results obtained in the manufacture of rice husk briquettes derived from rice husks Table 1 shows that the thickness of 12 cm rice husk better, because they have a greater density is 1,537 kg/m^3. Results obtained clean water was very much. Results of the study of chemical elements by looking at the chemical composition of rice husk charcoal in table 2, shows that the husk has a value of 96.74% composition. The high silica content in the rice husk encourages various studies on the use of rice husk. The silica content in organic materials have active sites and useful as absorbent because it is unstable and easily soluble in various solvents.

The most common value content of silica (SiO2) in the rice husk ash is 94-96% and if values close to or below 90% chance husk samples that has been contaminated by other substances that lower silica content. See figure 3, from the graph to see of rice husk charcoal briquettes that have been made, indicating that the compound has decreased due to the addition of clay and sago.

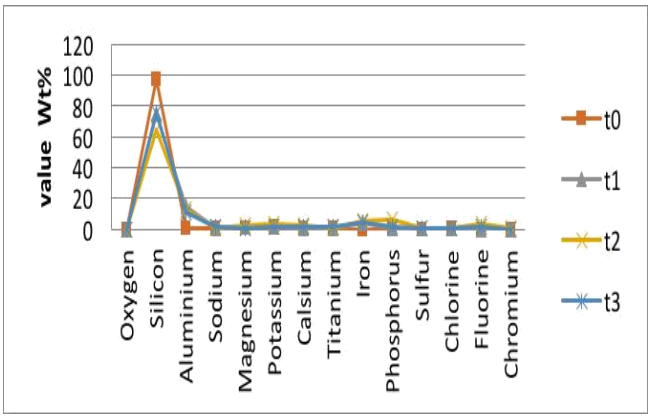

Fig 5. The chemical composition of rice husk

V. CONCLUSION

1. Design briquetting of rice husk with 3 variables, the resulted that the thickness of 12 cm has a good density is 1,345.
2. Rice husk briquettes of the results showed that the compound has a rice husk silica (SiO2), which is 96.74 % higher useful in the process of distillation of sea water into clean water to bind heavy metals contained in sea water .

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