THE PRODUCTION OF BRIQUETTE BIOPELLET FROM WASTE OF ARABICA COFFEE (Coffea Arabica) HUSK BY USING CORNSTARCH AS A GLUE

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Abstract: Biomass is defined as a fuel that is renewable and has great potential in current energy developments. One of the potential bimass that is starting to be looked at currently is that it comes from waste that has not been used optimally for example, such as waste arabica coffee bean husks. This waste can be converted into a renewable energy source in the form of biomass. In an effort to improve the quality of biomass burning, biomass fuel is developed in the form of pellets known as bio pellets. This study aims to determine the effect of different carbonization times and adhesive compositions. The production of bio pellet briquettes from the material of Arabica coffee husk waste with cornstarch adhesive was carried out with variations in carbonization time such as 30, 45, 60, 75, and 90 minutes with a constant temperature of 500^{0}C and variations in the composition of cornstarch adhesive, such as 10, 15, 20, 25, 30 %. The results of the research showed the optimal timer in making briquette bio pellets from coffee husk waste is 60 minutes carbonization time and the best adhesive composition is at 20% with the results of the analysis is 10.4172% of moisture content, 1.4599% of ash content and 22.8723% of volatile matter content, 65.2506%, of fixed carbon (fixed carbon) content, 8 of organoleptic test and calorific value of 5084.9489 cal/gr

Keywords: Biopellet, Arabica Coffee Husk, Cornstarch

INTRODUCTION

Energy is needed in every human activity, especially in economic, household, industrial, business and transportation activities. Most of the energy supply in the world comes from fossil fuels which are non-renewable energy sources. Current energy needs are expected to continue to increase, while available reserves such as oil and coal are decreasing. In addition, the use of fossil fuels as energy contributes to excess carbon in the atmosphere, causing global warming (Jukic and Jerkovic, 2008). These factors encourage the government to immediately produce an alternative energy that is renewable and friendly for environment. Therefore, it is necessary to make efforts to find alternative fuels that are cheaper and available. This alternative energy source is biomass energy which is very abundant and easy to obtain and can be renewed quickly. In general, the biomass that is used as fuel is biomass that has low economic value or that is the result of extraction from primary products (El Bassam and Maegard, 2004) or in other words, that is a waste material from the processing of a product.

Waste can also be defined as waste material or residual material from the processing of agricultural and plantation products. The process of natural waste destruction takes place slowly, so the accumulation of waste does not only disturb for environment but can interfere with human health (Setyawan in Putri, 2020). The paradigm in the mention of this waste must be changed due to the development of human knowledge which continues to grow rapidly. Agricultural waste materials such as biomass can be processed as an alternative energy source that has high value. Biomass has the potential as an alternative fuel to replace fossil fuels because of its high carbon content and its renewable nature, besides that it is abundantly available and the price is relatively cheap.

One of the wastes that has not been used optimally in the current conditions is coffee bean husk waste. Coffee husk is an agricultural waste and the utilization of that material has not been carried out optimally. Communities, especially in mountainous areas, generally use coffee husk waste as fertilizer, fodder or just leave it and throw it away. Even though this coffee husk waste can be further utilized and used as another alternative fuel. It should be

noted that in 3 tons of coffee logs will only get 1 ton of ready-to-process coffee beans, the rest is coffee waste that will be thrown away (Affanda in Putri, 2020) or has not been utilized optimally.

Biomass can be used as fuel directly and it has been done by the Indonesians for a long time, but biomass also has disadvantages if it is burned directly because it has poor physical properties, such as low energy density, problems with handling, storage and transportation (Saptoadi, 2006). In improving the quality of burning biomass, currently biomass fuel in the form of pellets known as biopellets that has been developed. The advantages of pellets as fuel include high density, easy storage and handling. The main factors that affect the strength and durability of pellets are raw materials, moisture content, particle size, pressing conditions, addition of adhesives, densification tools, and treatment after the production process (Lehmann, et al. 2012).

Therefore, to provide added value to agricultural biomass waste in the form of coffee husks, research is carried out to obtain renewable alternative energy. The research conducted was the manufacture of pellets briquettes by utilizing agricultural biomass waste in the form of coffee husks with different compositions and treatments. These bio pellets can be used as fuel for household needs, apart from their smaller size they are also more economical.

Based on the background of the problems above, there are three problems in this study that will be discussed. (1) What are the characteristics of the coffee husk that can be used as bio pellets briquettes. (2) What is the effect of the variation in carbonization time and adhesive concentration on producing briquette bio pellets. (3) What is the optimal formula composition for producing bio pellets briquettes from coffee husks

There are three objectives of this research that will be achieved is (1) Knowing the characteristics of coffee husk which is used as biopellet briquettes. (2) Knowing the effect of adhesive concentration and Carbonization time on producing briquette bio pellets and (3) Determining the best formulation composition for the manufacture of briquette bio pellets from coffee beans

Meanwhile, there are three benefits of this research (1) Providing alternative energy to replace fossil fuels in the form of biopellets that can be used in everyday life. (2) Providing a solution for utilizing coffee husk biomass to become bio pellets that can be used for household-scale fuel. (3) As one of the contributions in the development of science so as to add insight, especially in the manufacture of briquette bio pellets.

LITERATURE REVIEW

The scientific name for Arabica coffee is *Coffea arabica*. Carl Linneaus, a Swedish botanist, classified it into the Rubiaceae family, the Coffea genus. Previously this plant was identified as Jasminum arabicum by a naturalist from France. Arabica coffee is thought to be a hybrid species resulting from crossing Coffea eugenioides and Coffea canephora (Hamni, 2013). The systematics of the Arabica coffee plant according to Hasrianti (2017) is as follows: Kingdom: Plantae, Sub kingdom: Tracheobionitta, Division: Tracheophyta, Class: Magnoliopsida, Subclass: Astridae, Order: Rubiaceae, Genus: Coffea, Species: Coffea arabica

The process of producing coffee beans into coffee powder, also produces waste in the form of coffee husk waste, but the resulting coffee waste has not been used optimally and is allowed to accumulate so it becomes one of the causes of environmental pollution. Based on the large amount of coffee available, of course, coffee processing will produce a lot of coffee husk waste as well.

This problem can be dangerous for the environment if it is present in large quantities, because it can cause air pollution. On the other hand, a coffee husk that is neglected can also be a place for pathogenic bacteria to grow, considering that the nutritional content is still quite high. Therefore, the disease that is caused can become an epidemic, because it is carried by the wind or flies that land on it.

So far, the use of coffee husks is only used as plant fertilizer or livestock feed, coffee husk waste is still not widely used for things that are more supportive for human life. It should be noted that in 3 tons of coffee logs, only 1 ton of ready-to-process coffee beans will be obtained, the rest is coffee husk waste which will be thrown away (Dzafar, 2008). In the early stages of utilizing coffee husk waste which was just thrown away and with the help of science and

technology development, therefore coffee husks can be used as raw material in the manufacture of briquette biopellets.

An adhesive material is needed in the manufacture of bio-briquettes which has the function of gluing the substance particles in the raw material (bio-charcoal) in the process of producing bio-briquettes. Cornstarch is one type of organic adhesive that can be used. This cornstarch adhesive is chosen because it is cheap and easy to obtain.

Adhesives from plants such as cornstarch have the advantage that the amount of adhesive needed for this type is much less than for hydrocarbon adhesives. Adhesive materials from plants have a weakness is their nature can absorb water from the air so it is not good when it is in high humidity. The characteristics of the adhesive raw material for the manufacture of bio-briquettes are that it has a good cohesive force when mixed with charcoal, is flammable, non-smoky, easy to obtain in large quantities, and inexpensive and does not emit odors, is non-toxic and harmless

RESEARCH METHODOLOGY

Materials and Tools

a. Materials

Coffee Husk 5 Kg, Cornstarch 500 gr

b. Tools and Equipment

Furnace/Furnace 1 Unit, Grinder and Shieving 1 Unit, Bomb Calorimeter 1 Unit, Biopellet Printing Tool 1 Set, Analytical Balance 1 Unit, Watch glass 3 Pieces, Spatula 1 Piece, Crucible 8 Pieces, Pot 1 Fruit, Basin 1 Fruit, Wipe 1 Fruit, Oven Gloves 1 Set

Research procedure

a. Raw Material Preparation (Sample Preparation)

Collect and clean the coffee husk from impurities, The coffee husk that has been cleaned is then dried under the sun light to dry, after it is sufficiently dry, the raw material for the coffee husk is ready for the carbonization process using a furnace.

b. Raw Material Carbonization Process

Prepare the tools and materials to be used, Prepare 500 gr of coffee husk to be carbonized, Put the coffee husk into the furnace, and Set the carbonization temperature with the length of time variation to carbonize the raw material to become charcoal, After setting the temperature and time are reached, turn off the furnace, After the raw material is cold, the raw material is ready for grinding

c. Reducing the Size of Raw Materials

Turn on the grinding tool *(Ball Mill)*, put the raw material in, After obtaining the raw material with the appropriate size, the raw material is sifted in a sieving tool with a size of 60 mesh, The raw material is ready to be added adhesive and printed

d. Biopellet Producing Process

Prepare 100 grams of fine charcoal and then put it in the container, Make an adhesive by dissolving cornstarch with a composition of 10, 15, 20, 25, 30% by weight of the fine charcoal and then dissolving it with 100 mL and heating it until it turns thick and glue, Mix the ingredients with the adhesive and stir until well blended, Print using a briquette bio pellet printer, Dry the bio pellets by drying them in the sun for 2 – 3 days until completely dry, Do the

product analysis which includes analysis of SNI standards such as water content, ash content, volatile matter content, fixed carbon content, calorific value, and organoleptic test.

Product Analysis

a. Measurement of Water Content (SNI 8021:2014)

Weigh a sample of 1 gram in a porcelain cup whose weight is known, Put the cup in the oven for 1 hour at 100°C-105°C or until the weight becomes constant, then remove the sample from the oven and put it in the desiccator and weigh it immediately after it reaches room temperature, Put the material back into the oven until a constant weight is achieved (the difference between successive weighings is 0.002 gram). The weight loss is calculated as a percentage of moisture content and is calculated by the following formula. Water content can be calculated by the equation:

$$\text{Water Content (\%)} = \frac{b-a}{b-c}\ x\ 100\%$$

Information:

a : weight of cup + lid (gr) b : weight of cup + lid + sample (gr) before heating, c : weight of cup + cover + sample (gr) after heating

b. Ash Content (SNI 8021:2014)

Weigh a sample of 3 grams on a porcelain crucible whose weight is known, Put the cup into the furnace for 4 hours at 650oC or until the weight becomes constant, Then remove the sample from the furnace and put it in the desiccator and weigh it immediately after it reaches room temperature. The weight loss is calculated as a percentage of ash content and is calculated by the following formula.

Ash content can be calculated by the equation:

$$\text{Ash Content (\%)} = \frac{c-a}{b-a}\ x\ 100\%$$

Information: a : weight of empty cup (g), b : weight of cup + sample (gr) before heating, c : weight of cup + sample (gr) after heating

c. Measurement of Volatile Matter Content (SNI 8021:2014)

Place a bio pellet sample in a crucible cup with a lid whose weight is know, Put the porcelain cup into the furnace at 950°C for 7 minutes, After evaporation is complete, the cup is cooled in a desiccator and then weighed and then continue to the calculation process

Volatile matter content can be calculated by the equation:

$$\text{Volatile Matter (\%)} = \text{Weight Loss} - \text{Water Content}$$

$$\text{Volatile Matter (\%)} = \frac{b-a}{b-c}\ x\ 100\%$$

Information:

a: weight of empty cup (g, b: weight of cup + sample (gr) before heating, c: weight of cup + sample (gr) after heating

d. Fixed Carbon Measurement (SNI 8021:2014)

The principle of determining the content of fixed carbon is to calculate the fraction of carbon in the material, excluding volatile matter and ash. Fixed carbon content is calculated using the equation:

$$\text{Fixed Carbon (\%)} = 100 - (\text{IM} + \text{Ash} + \text{VM})$$

Information:

IM: Moisture content, Ash: Ash content, VM: Level of volatile matter

e. Calorific Value Measurement (SNI 8021:2014)

Place 1 gram of the test sample in a silica cup and tie it with a nickel wire, Put the sample into the tube and close it tightly. The tube containing the sample was oxygenated for 30 seconds, Insert the Tube into the Oxygen Bomb Calorimeter.
Calorific value can be calculated using the equation:

$$NK = \frac{Delta\ T - B}{mbb}\ x\ 100\%$$

Information:

NK: Calorific Value (Cal/gr), Delta T: Difference in temperature after and before combustion (0C), Mbb: Fuel Period (gr), B: Correction of Heat on the Wire (Cal/gr)

f. Organoleptic Test

Organoleptic or also known as sensory test or sensory test is a method of testing using the human senses as the main tool for measuring the acceptability of a product. In this study, the senses used were the sense of sight/eye, the sense of touch/hand, and the sense of smell/nose while the sense of taste/tongue was not used.

Make observations of the available products, Provide an assessment of the appearance of the product in terms of color, texture and aroma of the product produced, Provide an assessment based on a rating scale of 1-10.

Flowchart of Producing Biopellets Briquettes from Coffee Husk Waste

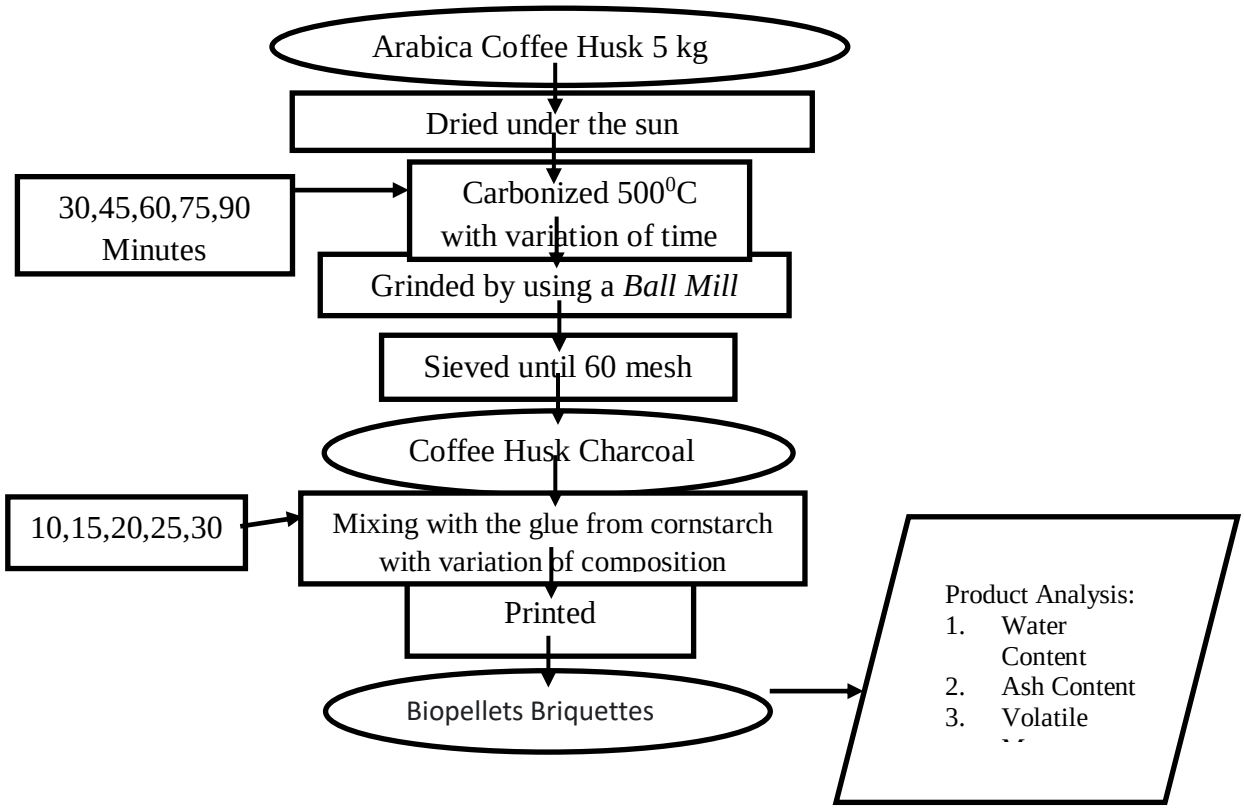

Figure 1. Flowchart for Producing Biopellets Briquettes from Arabica Coffee Husk Waste

RESULTS AND DISCUSSION

The Effect of Carbonization Time on Water Content

Based on the results of the research that has been done, it is obtained a graph of the relationship between the effect of carbonization time on water content can be seen in the picture below.

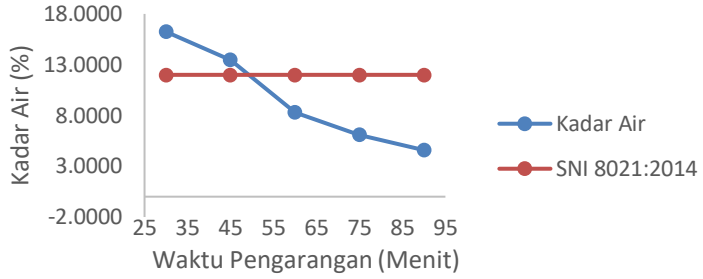

Figure 2. Graph Of The Effect Of Carbonization Time On Water Content

From the figure, it can be seen that the value of the water content in the research above, the parameter value of the water content decreased along with the addition of carbonization time. Based on the research results, the water content obtained ranged from 4.5845-16.2450%. The lowest water content was found at 90 minutes of carbonization time that is 4.5845%, while the highest water content was found at 30 minutes of carbonization time that is 16.2450%. From the picture above it can be seen that there are several water content parameter values that have met the quality standards of biopellets based on the National Standardization Agency (BSN) and SNI 8021-2014. One of the factors that can cause low water content is the length of time carbonization takes place. The longer the carbonization process lasts, the more water is wasted, so the resulting water content is also getting lower (Siahaan, 2013).

The Effect of Carbonization Time on Ash Content

Based on the results of the research that has been done, the graph of the relationship between the effect of carbonization time on the ash content can be seen in the picture below

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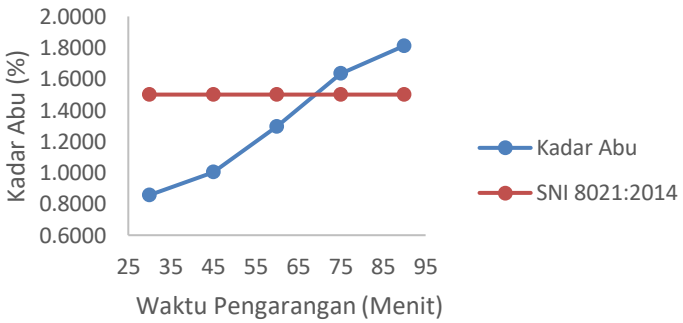

Figure 3. Graph of the Effect of Carbonization Time on Ash Content

From the picture above it can be seen that the value of the parameter ash content has increased by the addition of carbonization time. Based on the research results, the ash content obtained ranged from 0.8569-1.8127%. The lowest ash content was found at 30 minutes carbonization time that is 0.8569%, while the highest ash content was found at 90 minutes carbonization time that is 1.8127%. From the picture above it can also be seen that there are several ash content parameter values that have met the quality standards of biopellets based on the National Standardization Agency (BSN) and SNI 8021-2014 and there are also those that do not meet standards such as 75 minutes and 90 minutes of carbonization time. The ash content parameter values above show a tendency to increase by the addition of carbonization time. This is in accordance with the existing theory where the longer the

carbonization time, the ash content will increase because the carbon produced will burn out and leave ash which is the result of combustion residue (Yudanto et al, 2009)

The Effect of Carbonization Time on Volatile Matter Content

Based on the results of the research that has been done, the graph of the relationship between the effect of carbonization time on the levels of volatile matter can be seen in the image below.

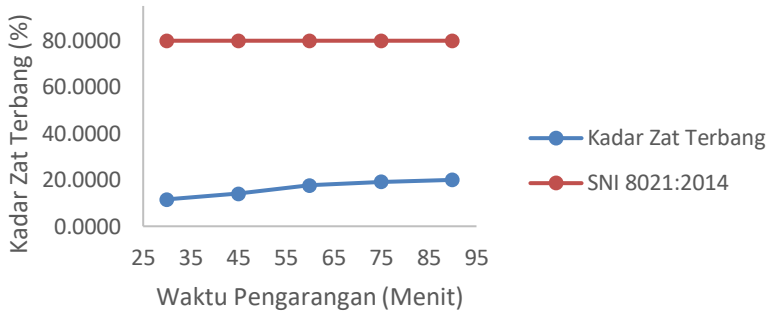

Figure 4. Graph of Effect of Carbonization Time on Volatile Matter Content

From the picture above, it can be seen that the parameter value of volatile matter content has increased by the addition of carbonization time. Based on the research results, the volatile matter content obtained ranged from 11.6047-20.0040%. The lowest volatile matter content was found at 30 minutes carbonization time that is 11.6047%, while the highest volatile matter level was found at 90 minutes carbonization time that is 20.0040%. From the picture above, it can also be seen that the value of the volatile matter parameter meets the quality standards of biopellets based on the National Standardization Agency (BSN) and SNI 8021-2014. The value of the volatile matter content complies with SNI 8021-2014 which requires that the value of the volatile matter content is a maximum of 80%. The higher the level of volatile matter in a fuel, the efficiency of burning the fuel will decrease and the more smoke produced (Nurwigha 2012).

The Effect of Carbonization Time on Fixed Carbon Content

Based on the results of the research that has been done, the graph of the relationship between the effect of carbonization time on the fixed carbon content can be seen in the picture below.

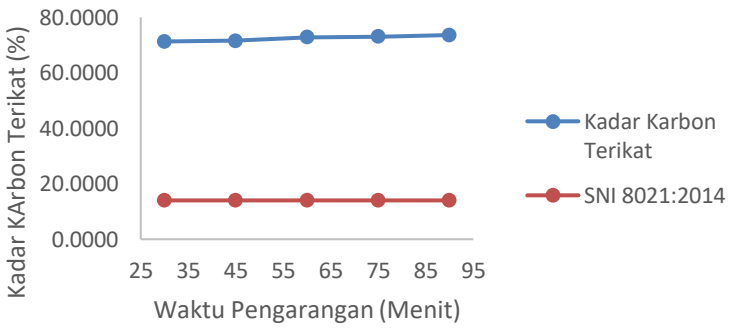

Figure 5. Graph of the Effect of Carbonization Time on Fixed Carbon Content

From the picture above it can be seen that the parameter value of fixed carbon content increases by the addition of carbonization time. Based on the research results, the fixed carbon content obtained ranged from 71.2935-73.5988%. The lowest fixed carbon content was found at 30 minutes of carbonization time that is 71.2935%, while the highest fixed carbon content was at 90 minutes of carbonization time that is 73.5988%. From the picture above it can also be seen that the parameter value of fixed carbon content meets the quality standards of biopellets based

on the National Standardization Agency (BSN) and SNI 8021-2014. The value of the volatile matter content complies with SNI 8021-2014 which requires that the value of the volatile matter content is at least 14%

The Effect of Carbonization Time on the Organoleptic Test

Organoleptic test or sensory test or sensory test is defined as a method of testing using the human senses as the main tool to measure the acceptability of a product. The senses used in the organoleptic test in this study were the sense of sight or eyes, the sense of touch or hands and the sense of smell or nose. The ability of these sensory organs will be an assessment of the product being tested according to the sensors or stimuli received (Gusnadi et al. 2020).

Based on the results of the research that has been done, it is obtained a graph of the relationship between the effect of Carbonization time on the organoleptic test can be seen in the picture below.

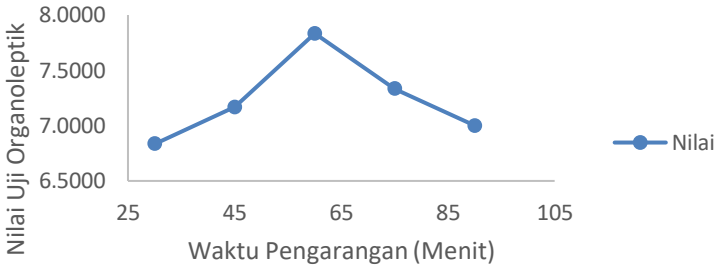

Figure 6. Graph of Effect of Carbonization Time on the Organoleptic Test

Based on the results of the research, the 60 minutes of carbonization time produced the best carbon with the characteristics of a deep-black color, a distinctive texture, still had a slight of coffee aroma, and there was not much ash on the results of the charcoal. When compared with the 30 and 45 minutes of carbonization time, the resulting carbon that is still slightly brown in color. Meanwhile, the 75 and 90 minutes of carbonization time produced carbon which tended to produce quite a lot of ash.

Based on the results of some of the analyzes above, it can be seen that the optimum results for the organoleptic test parameters and when associated with other parameters such as moisture content, ash content, volatile matter content and fixed carbon content, all these parameters meet the quality standards of SNI 8021-2014 biopellets. With these various considerations, it can be stated that the best carbonization time for producing the charcoal for the biopellets briquettes is in the carbonization time of 60 minutes.

The Effect of Constarch Adhesive Composition on Water Content

Based on the results of the research that has been done, a graph of the relationship between the adhesive composition on the water content of the biopellets can be seen in the image below.

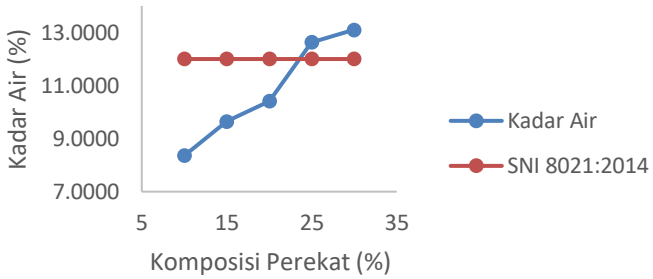

Figure 7. Graph of the Effect of Adhesive Composition on Moisture Content

From the figure it can be seen that the water content in the research above, the value of the water content has increased along by the addition of the adhesive composition. Based on the research results, the water content obtained ranged from 8.3558-13.1061%. The water content obtained in this study tends to show an increase along with the addition of the added adhesive composition. This is due to the addition of the water content of the adhesive itself, so that the water content of the briker biopellets will also increase.

The water content greatly affects the calorific value or heat generated. The higher the water content, the lower the calorific value and the quality of the biopellet briquettes is also getting worse. This is because the heat stored in the briquettes is first used to remove the existing water before then producing heat that can be used as combustion heat (Hendra, 2002). Another factor that can reduce the water content of briquette biopellets is the length of time it takes to dry. The longer the drying is carried out, the more water is wasted so that the water content of the briquettes produced is lower (Siahaan, 2013).

The Effect of Cornstarch Adhesive Composition on Ash Content

Based on the results of the research that has been done, a graph of the relationship between adhesive composition and ash content of briquette biopellets can be seen in the image below.

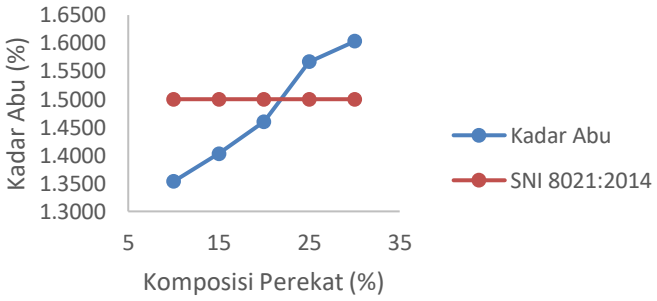

Figure 8. Graph of the Effect of Adhesive Composition on Ash Content

From the picture above it can be seen that the value of the parameter ash content has increased along by the addition of the adhesive composition. Based on the research results, the ash content obtained ranged from 1.3532-1.6029%. The lowest ash content was found in the 10% adhesive composition which was 1.3532% while the highest ash content was found in the 30% adhesive composition which was 1.6029%. From the picture above it can also be seen that there are several ash content parameter values that meet the quality standards of biopellets based on the National Standardization Agency (BSN) and SNI 8021-2014. While the value of the ash content parameter that does not meet the criteria is found in the adhesive composition of 25% and 30%. The value of the ash content parameter above shows a tendency to increase with the addition of the adhesive composition. The more adhesive used, the higher the ash content obtained.

The Effect of Cornstarch Adhesive Composition on Volatile Matter Content

Based on the results of the research that has been done, a graph of the relationship between the composition of the adhesive and the volatile matter content of the biopellets briquettes can be seen in the image below.

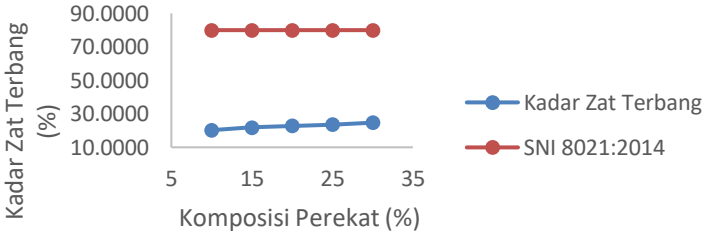

Figure 9. Graph of the Effect of Adhesive Composition on Volatile Matter Content

From the picture above it can be seen that the parameter value of volatile matter content has increased along by the addition of the adhesive composition. Based on the research results, the volatile matter content obtained ranged from 20.2377-24.7293%. The lowest volatile matter content was found in the 10% adhesive composition that is 20.2377%, while the highest volatile matter content was found in the 30% adhesive composition that is 24.7293%. From the picture above it can also be seen that the value of the volatile matter parameter meets the quality standards of biopellets based on the National Standardization Agency (BSN) and SNI 8021-2014. The value of the volatile matter content complies with SNI 8021-2014 which requires that the value of the volatile matter content is a maximum of 80%. The higher the volatile matter content of a fuel, the fuel combustion efficiency will decrease and the more smoke produced (Nurwigha 2012) or in other words the more adhesive used will result in higher volatile matter and cause the calorific value contained in biopellets briquettes the lower (Putri, 2020)

The Effect of Cornstarch Adhesive Composition on Fixed Carbon Content

Based on the results of the research that has been done, a graph of the relationship between the composition of the adhesive and the carbon content fixed to the briquette biopellets can be seen in the image below.

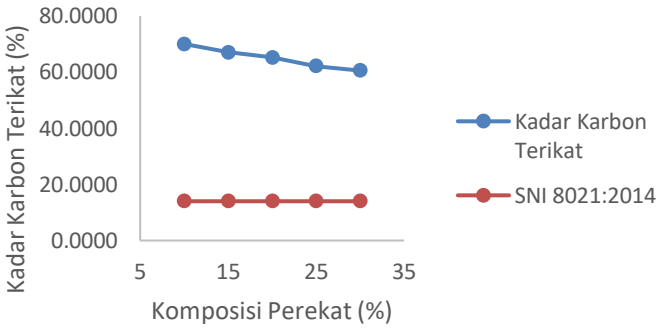

Figure 10. Graph of the Effect of Adhesive Composition on Fixed Carbon Content

From the picture above it can be seen that the parameter value of the fixed carbon content decreased with the addition of the adhesive composition. Based on the research results, the fixed carbon content obtained ranged from 70.0532-60.5618%. The highest fixed carbon content was found in the 10% adhesive composition that is 70.0532%, while the lowest fixed carbon content was found in the adhesive composition that is 60.5618%. From the picture above it can also be seen that the parameter value of fixed carbon content meets the quality standards of biopellets based on the National Standardization Agency (BSN) and SNI 8021-2014. The value of the volatile matter content complies with SNI 8021-2014 which requires that the value of the volatile matter content is at least 14%.

The Effect of Cornstarch Adhesive Composition on the Organoleptic Test

The graph of the relationship between adhesive composition and organoleptic tests can be seen in the image below.

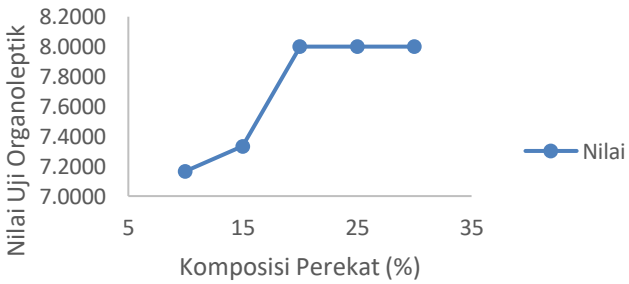

Figure 11. Graph of The Effect of Adhesive Composition on Organoleptic Test

From the picture above it can be seen that the highest organoleptic test parameter values were found in the addition of 20, 25 and 30% adhesive composition. Based on the research results, the adhesive composition of 10 and 15%

produced biopellets which were brittle, easily crushed and did not have a good texture and attractive appearance. Whereas the adhesive composition of 20, 25 and 30% produced dense biopellets briquettes, had a smooth surface texture of biopellets briquettes and produced a good product appearance. From the organoleptic test, the highest values were obtained for the adhesive addition of 20, 25 and 30% composition, but when referring to the results of other analyzes such as moisture content, ash content, volatile matter content and fixed carbon content, the composition of 25 and 30% did not meet the criteria for moisture content and ash content, according to SNI 8021-2014.

Based on the results of the organoleptic analysis above, it can be seen that at the highest value of the organoleptic test parameters and associated with other parameters such as moisture content, ash content, volatile matter content and fixed carbon content, all parameters meet the quality standard of SNI 8021-2014 biopellets which are found in the addition of 20% adhesive composition. With these various considerations, it can be stated that the best adhesive composition is found in the 20% adhesive composition and will be followed by an analysis of the calorific value.

The Effect of Cornstarch Adhesive Composition on Calorific Value

The calorific value is an important parameter in determining fuel quality which is influenced by moisture content, ash content, volatile matter content and fixed carbon content. The lower the water content and ash content will increase the calorific value of the fuel. Liliana (2010) said that biopellets have a minimum calorific value of 4036 kcal/kg, according to American, Austrian, German and French standards.

Based on the results of the analysis above, the best product in the form of biopellets briquettes is in the 20% adhesive composition, then followed by an analysis of the calorific value. And the result of the calorific value for the 20% adhesive composition was 5084.9489 cal/gr. The calorific value of the product meets the quality standards of SNI 8021-2014 which is at least 4000 cal/gr.

CONCLUSION

Based on the results of the research and observations and data collection has been carried out, it can be concluded that:

1. Biopellet briquette products from coffee husk waste produced meet Indonesian national standards based on SNI 8021: 2014
2. From the analysis process carried out, it can be seen that the length of time it takes to set and the composition of the adhesive used in the manufacture of biopellets briquettes can affect the quality of the biopellets produced. The longer the Carbonization time and the greater the adhesive composition, the lower the quality of the briquette biopellets produced.
3. From the results of the study it can be seen that the best quality of biopellets briquettes is found in the carbonization time of 60 minutes and the adhesive composition of 20% with a moisture content of 10.4172%, ash content of 1.4599%, volatile matter content of 22.8723%, the fixed carbon content of 65.2506%, the organoleptic test value was 8 and the results of the calorific value was 5084.9489 cal/gr. Based on the results of this analysis and consideration of organoleptic test, the resulting product meets the biopellet standards according to SNI 8021-2014.

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