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Biomass Briquettes

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ABSTRACT

Biomass briquette is primarily used as a biofuel substitute to coal and charcoal. Briquettes are eco- friendly, cost effective and come in good use as a fuel to the developing world. These briquettes are composed of agricultural waste and can be renewable. It is a significant method to bring down the waste of convention energy sources to a substantial level through the development, and growth of the briquettes technology. Another key factor of the briquettes is that it reduces the addition of fossil fuels to the environment. Its effectiveness depends on several factors such as Calorific Value, Ash Content, Fixed Carbon and Moisture Content. Therefore, this substitute energy holder should be given national priority as it appears to be the only permanent solution to prevent deforestation and avoid pollution.

Key words*: *Biofuel, agriculture waste, fossil fuels, Calorific Value, Moisture Content

I. INTRODUCTION:

The term-'Briquette' originates from the French language, which means brick. The briquette is a compressed mold which contains compounds from various organic materials. Biomass is a fuel that is developed purely from organic substances, and is an elegant and eco- friendly form of energy, used to create electricity or other useful forms of power. It is a profitable energy carrier. As a renewable energy source, biomass has started to look much more favorable in today's world. It is bound to serve as a future energy supply to technological progress. [1]

II. CALORIFIC VALUE OF BRIQUETTE:

The calorific valueor heating value indicates the quality of the fuel briquettes. It checks the energy content of the briquettes. It is the amount of heat evolved when a pressed fuel briquette is completely burnt and the combustion products are cooled.The calorific value is closely related to the amount of oxygen required for steady combustion. 14,022 J of energy can be released when, one gram of oxygen is burnt. This shows that higher the oxidation of the biomass material, lesser is the oxygen required for thorough combustion, and the calorific value also would be less. Whereas if the fuel consists of compounds with lower oxidation degrees (hydrocarbons), the heating value of the material will be higher.[2]

Groundnut shell	4524
Baggasse	4380
Saw dust Briquette	3895
Cotton stalk	4252
Bamboo dust	4160
Coffee Husk	4046
Tobacco waste	2910
Tea waste	4240
Paddy straw	3470
Wheat straw	4100
Sunflower stalk	4300
Jute waste	4429
Soya Bean Husk	4170
Sugarcane	4000
Woodbark	1270
Rice Husk	3200
Woodchips	4785

Raw Materials with their Calorific Value(in kcal/kg)

III. MOISTURE CONTENT OF BRIQUETTE:

Moisture content is the total water present in the fuel.The moisture content can be measured by taking a small pre-weighed sample and oven drying it at 105oC until the required consistency in the sample's mass is obtained. The change in weight can then be used to determine the sample's percentage moisture content. The burning characteristics of the biomass can be greatly affected by the moisture content. During combustion, the moisture in the biomass will absorb heat from the burning fuel to form vapor due to heat of vaporization, thereby appreciably reducing the heating value of a used fuel.Practically, burning a fuel with such high moisture content will result in significant products of incomplete combustion.[3]

Moisture Content of Some Briquette Materials

Biomass Material	% by weight dry basis
Waste Paper	6.24
Dried Leaves and Waster Paper	6.52
Coconut Husk and Waste Paper	7.19
Bagasse and Waste Paper	5.94

IV. MATERIALS REQUIRED:

1. Raw Material(Biomass)
2. Binder(Wax, Resin, Starch, Gum Arabic)
3. Water
4. A Briquette Press(A hand plunger)

V. PROCEDURE:

1. First, the raw material is shred into small pieces and transferred to a water bucket. The organic waste (biomass) is grinded/shredded into small particles of variable sizes ranging from 1 to 10 mm. Then, the grindedparticles are mixed with the paper pulp on different volume fractions such as 80:20, 70:30, 60:40 and 50:50.
2. When the buckets are full, add enough water to cover the top of the shreds. If you let the shreds soak for a few days, it will be easier to blend them.
3. Then, add the mixture of the pulp and water into a grinder. Remove it from the grinder when the mixture has completely blended in a proper ratio, so it could be compressed.
4. Add the mixture into a briquette press. When it is in the cylindrical mould, a load is applied by means of a hand plunger. The excess water present in the pulp comes out through the holes present in the sides of the cylindrical mould.
5. After taking the briquettes out of the mould, they need to be dried by careful measures under dry conditions.

Figure 2: Hand-pressing mould for preparing briquettes

VI. OBSERVATION:

1. When the briquette is ready and left to dry, it tends to harden overtime and holds better shape. Thus gets affected by the presence of air.
2. The presence of saw dust in the composition of one of the briquettes leads to increase in burning time, but thebriquettes prepared from only waste paper result in rapid burning. So, every residual material when combined with waste paper could properties
3. Increasing the biomass will result in a decrease in the ash content, which is valuable.

VII. PRECAUTIONS:

1. It is necessary to completely dry the briquette after it is compressed, as to increase its combustibility. Thus, the moisture content and temperature in the environment should be maintained.
2. The mixture needs to be compressed with great pressure by using the required load. If this is not done, the mixture might crumble to pieces when it is removed from the mould.

VIII. APPLICATIONS:

1. The primary use of the biomass briquette is for heating purposes, as it acts like a renewable fuel.(Residential & Commercial Heating for winter, cooking fuel, heating in cold remote areas and house hold kitchen appliances)

2. Biomass briquettes can reduce the use of substances such as Diesel, Kerosene, Furnace Oil, Lignite, Coal and Firewood.
3. With the right composition of carbon, hydrogen, and oxygen, the biomass briquettes can be compressed into a flat sheet, which can be inserted in ground home walls for insulation purposes.
4. Biomass briquettes can be used in the process of 'gasification'. [4]
5. The manufacturing process of the briquettes can serve as employment opportunities for people who live in rural areas.

IX. LIMITATIONS:

1. Combustion of biomass as a fuel also consumes it at a much faster rate than it can be replaced. The demand of excessive crop yield is a burden on the farmers.

2. Burning biomass directly as a fuel produces more greenhouses gases than can be absorbed by remaining plants, making it a hazardous contributor to global warming.[5]

X. CONCLUSION:

This experimental procedure focuses on the production of biomass briquettes on a low scale, by using relatively low pressure and the wet technique. The low pressure- wet technique is an alternative to the high pressure- dry technique, which is used on a larger stage. We learnt that the briquette can be enhanced by altering various factors affecting its behavior. As an environment protection enthusiast, I think it is necessary to raise awareness of the use of biomass briquettes as a fuel and protect earth from dangerous effects of the other inefficient fuels.

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