International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 06 | June-2016 www.irjet.net p-ISSN: 2395-0072

Effect Of Filler On Characteristics Of Fuel Pellet

Yugandhara Gujar[1], Dr. S. B. Thakare[2], Prof. S. M. Gawande[3]

[1]Student, Dept. of Civil- Environmental Engineering, ABMSP's APCOER, Pune.
[2]Guide, Dept. of Civil- Environmental Engineering, ABMSP's APCOER, Pune.
[3]Professor, Dept. of Civil- Environmental Engineering, ABMSP's APCOER, Pune, Maharashtra, India.

Abstract – *Energy requirement is increasing now days as increase in number of industries. Due to increase in industrialization leads to over exploitation of renewable energy sources. For energy requirement industries are dependent on these energy sources. During industrial processes waste is generated on huge quantity. Pelleting of waste is reliable option to overcome the waste disposal problem. Energy recovery from oil contaminated cotton waste can be achieved by pellets production from them. In this context, study on amount of filler had effect on characteristics of pellet is discussed.*

Key Words: Energy Requirement, Energy Sources, Energy recovery, Oil Contaminated Cotton Waste, Pellets.

1. INTRODUCTION

Oil contaminated cotton waste is considered as hazardous waste. Hence this cotton waste causes environmental pollution if not treated or disposed of properly. There are various treatment options for treatment of hazardous waste. Incineration and secured landfilling is the disposal options for cotton waste. These options have adverse effect on environment. Hence energy recovery from waste is a good option for utilization and minimization of waste. Energy recovery from cotton waste is achieved by production of fuel pellets. These fuel pellets are used for heating purpose in industries. Pellets were made up of mixture of shredded cotton waste, filler and binder. Amount of filler and binder have effect on characteristics of pellets.

2. METHODOLOGY

Fuel pellets from oil contaminated waste is obtained from the mixture of cotton waste, binder and filler. Manual shredding of cotton waste is difficult task. Hence shredder is use for shredding of cotton waste. Jaw shredder is used for shredding of garden waste. Garden waste is used as filler. Amount of binder is kept constant. Pellets were produced for different combination of mixture.

2.1 Composition of Pellets:-

The compositions of pellet sample are as follows:

Table- 1. Showing Composition of Pellet for Sample 1

Components	Weight (%)
Oil Soaked Cotton Waste	70
Binder	15
Filler	15

Table- 2. Showing Composition of Pellet for Sample 2

Components	Weight (%)
Oil Soaked Cotton Waste	65
Binder	15
Filler	20

Table- 3. Showing Composition of Pellet for Sample 3

Components	Weight (%)
Oil Soaked Cotton Waste	60
Binder	15
Filler	25

Table- 4. Showing Composition of Pellet for Sample 4

Components	Weight (%)
Oil Soaked Cotton Waste	55
Binder	15
Filler	30

Table- 5. Showing Composition of Pellet for Sample 5

Components	Weight (%)
Oil Soaked Cotton Waste	50
Binder	15
Filler	35

Table- 6. Showing Composition of Pellet for Sample 6

Components	Weight (%)
Oil Soaked Cotton Waste	45
Binder	15

Filler	40

Table- 7. Showing Composition of Pellet for Sample 7

Components	Weight (%)
Oil Soaked Cotton Waste	40
Binder	15
Filler	45

3. RESULT AND DISCUSSION

3.1 Moisture Content

Fuel pellets were prepared from the different combination of oil soaked cotton waste, binder and filler. Moisture content was recorded immediately after the formation of fuel pellets.

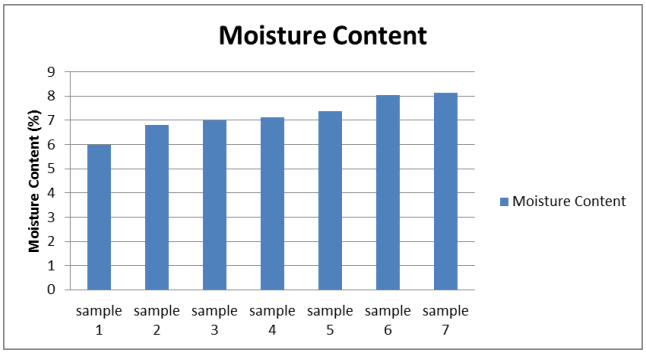

Figure- 1. Moisture Content For Fuel Pellet Samples

3.2 Volatile Matter

The dried sample of pellet was taken in the crucible covered with a lid and placed in muffle furnace. The temperature of muffle furnace was maintained at 960^{0}C ± 20^{0}C for 7 minutes. The crucible was cooled in air first and then inside a desiccator and weighted again. The percentage volatile matter was calculated by using following formula,

Percentage volatile matter = $\frac{W_2-W_3}{W_2-W_1}*100$

Where,

W_1 = weight of empty crucible (g)

W_2 = weight of crucible + sample (g)

W_3 = weight of crucible + sample after heating (g)

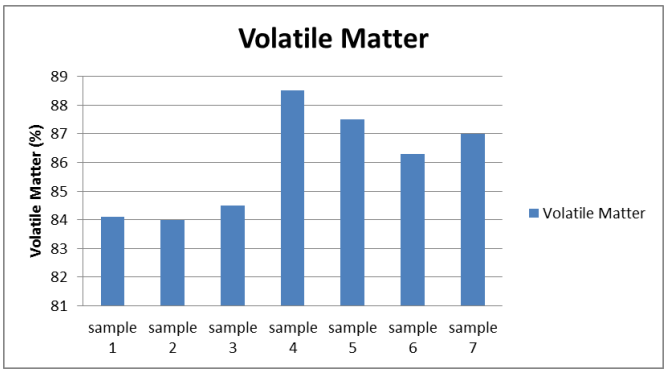

Figure- 2. Volatile Matter For Fuel Pellet Samples

3.3 Ash Content

The sample of fuel pellet in crucible was heated without lid in a muffle furnace at 650^{0}C ± 50^{0}C for 4 hours. The crucible was taken out. The crucible was cooled first in air, then in desiccator and weighted. The percentage ash content was calculated by using following formula,

Percentage ash content = $\frac{W_3-W_1}{W_2-W_1} * 100$

Where,

W_1 = weight of empty crucible (g)

W_2 = weight of crucible + sample (g)

W_3 = weight of crucible + ash (g)

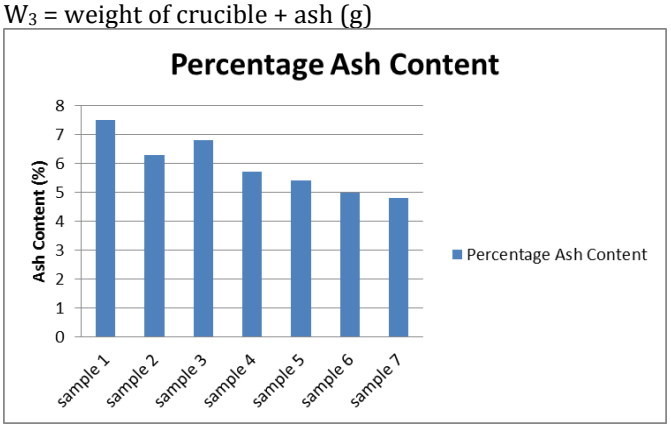

Figure- 3. Percentage Ash Content For Fuel Pellet Samples

3.4 Percentage Fix Carbon

Percentage fixed carbon was calculated by subtracting the sum of volatile matter and ash content from 100.

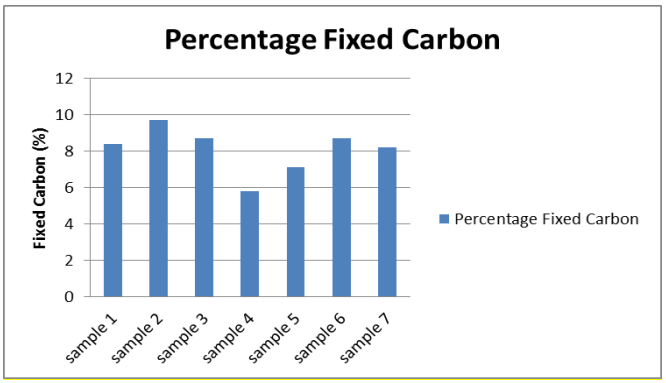

Figure- 4. Percentage Fixed Carbon For Fuel Samples.

3.5 Calorific Value

Calorific value determines the energy content of fuel. Calorific value is the most important fuel property. It is the property of fuel pellets that depends on its chemical composition.

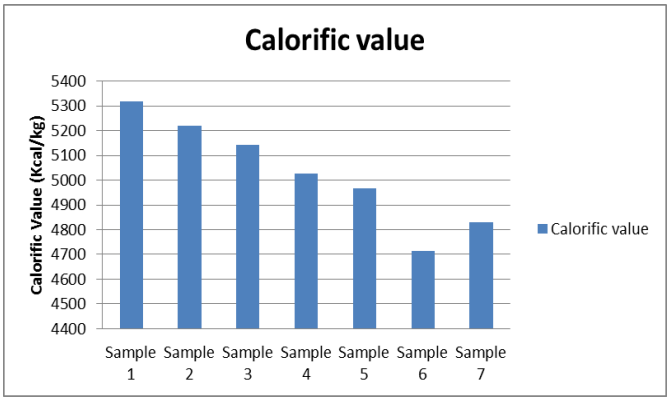

Figure- 5 Calorific Value of Fuel Pellet Samples

Calorific value of sample 1 is being high, it is found to be near about colorific value of coal. This heating value can produce enough heat required for industrial applications.

4. CONCLUSION

Pelleting technology is the promising technology for energy recovery. Pelleting technology enhances heating value of feedstock. It is a disposal solution for waste. Pellets obtained from cotton waste have high calorific value. Filler plays a vital role in formation of fuel pellets.

- As amount of filler increases moisture content increases.
- Calorific value of fuel pellet decreases with increase in amount of filler.

REFERENCES

[1] Environmental Management of Industrial Hazardous Wastes in India SHANTANU K DUTTA*, V P UPADHYAY** AND U SRIDHARAN.

[2] Idah, P. A, Mopah, E. J, "Comparative Assessment of Energy Values of Briquettes from Some Agricultural By Products with Different Binders," IOSR Journal of Engineering, vol. 3, Issue 1 (Jan. 2013) p. 36-42.

[3]P. D. Grover, "Agri-waste feed processing for energy conversion", Proc. International Conference 26-27, Bangkok, April 1996, 177-195.

[4] Emerhi E A "Physical and combustion properties of briquettes produced from sawdust of three hardwood species and different organic binders," Advances in Applied Science Research, 2011, 2 (6):236-246.

[5] Raphael Iddphonce Mkini, Zuwena Bakari, "Effect of Moisture Content on Combustion and Friability Characteristics of Biomass Waste Briquettes Made By Small Scale Producers in Tanzania", IJERR, vol.3, issue 1, month January-March, 2015.