Role of Waste Decomposer in Biogas and Energy Generation

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***Abstract*:- A 500 liter capacity prototype biogas plant of Aarti Model constructed at Bharat College of engineering. Mumbai University to investigate the anaerobic digestion in generating biogas using waste decomposer. Waste Decomposer is a consortium of few beneficial microorganisms which is isolated by Dr.Krishan Chandra in 2004 from desi cow dung and took 11 years to standardize the mass multiplication technique at the farm level.**

The digester was charged with slurry of onion and potatoes mixed with waste decomposer with a retentation period of 4 hours. The result obtained from the Chromatography report showed that it contains 3.837 % of carbon monoxide with 91.421% of methane and 4.742% carbon dioxide. Second Chromatography report showed that it contains 7.4643 % of carbon monoxide with 90.3519% of methane and 2.1838% carbon dioxide

This gas was flammable and it was used to run activa engine, which ran effectively. Result showed that biodegradable waste with decomposer can generate good quality of renewable gas which can be used for energy generation.

Keywords: Waste decomposer, Biogas, Slurry of biodegradable waste, Methane, active engine.

INTRODUCTION….

Methane gas is produced from the anaerobic digestion of organic materials. The gas is produced from a three phase process namely, Hydrolysis, Acid formation and methane forming process. The gas is typically composed of 50-70% methane, 30-40% Co_2, 1-3% nitrogen, 0-1% oxygen and carbon monoxide and trace of hydrogen sulphide.(1) Tonnes of garbage are available from the restaurants, vegetable market, food industry and houses of individuals which can be effectively converted into a usable gas by using waste decomposer. These waste material if piled up in landfills, dumping ground produces rotten smell and takes months to decompose releasing methane into atmosphere, which is responsible for global warming. This waste decomposes when applied in proportions to this garbage in a closed atmospheric conditions result in production of methane which can further be utilized for cooking, heating and for producing energy which otherwise would have damage atmosphere by global warming. Methane has ability to efficiently absorb heat in Earth's atmosphere. Studies have shown that over a 20 years period a l Kg of methane warms the planet as much as 80 times more than a l Kg of carbon dioxide, Methane last for may be a decade in Earth's atmosphere before it begins to react with a free radical called hydroxyl and turns into carbon dioxide, where it can stay there for centuries.

The 'WASTE DECOMPOSER' which is a consortium of beneficial microorganisms which can convert waste from kitchen, Agriculture and animals etc in 40 days into manure.

The objective of this study was to show a better way of recycling waste products and it's conversion into a methane gas. Slurry from the digester then can be used to produce fertilizer

MATERIALS AND METHOD

The bio digester used for this research is a 500 liters capacity plastic prototype digester and 200 liter capacity plastic drum. Onion and potatoes 1kg each was used for slurry preparation with 1 liters of waste decomposer solution. Retention period of 4hrs before pouring the slurry into the digester.Activa engine, Nipple, Tee fittings, Barb fitting, Ball Valve , gas pipe, balloons, 12 volt battery etc.

Table no 1:-
Charge Stock and Decomposer Ratio

Waste	Mass of waste /kg	Mass of waste decomposer[Liters]	Mixing Ratio
Onion	1 kg	1 liters	1:1
Potatoes	1 kg	1 liters	1:1

Figure no.1. Experimental Biogas setup.

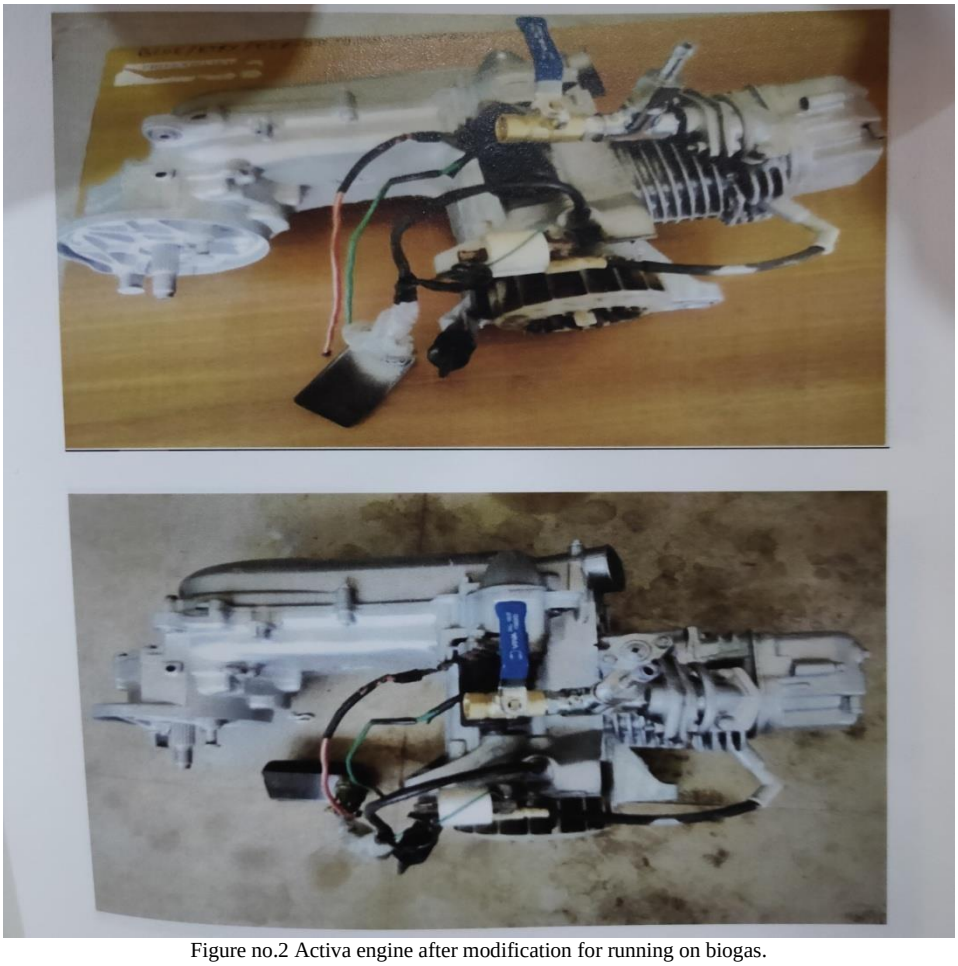


Figure no.2 Activa engine after modification for running on biogas.

EXPERIMENTAL PROCEDURE -

Onion and potato slurry was made in grinder using chutney jars and mixed with waste decomposer. After retentation period of 4 hours the slurry was poured into the 500 liter digester.(Figure no 1)

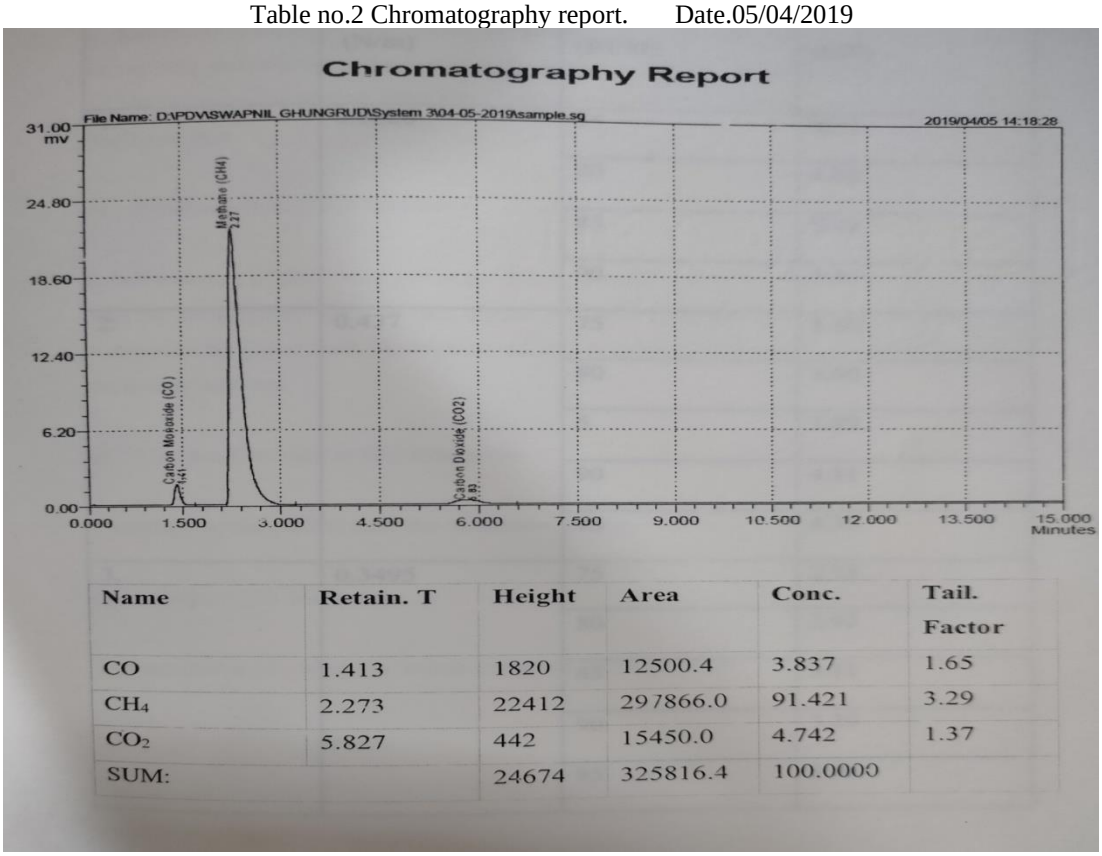
The process was repeated for a week, samples of gases were taken out for analysis and send to ICT College 'Matunga'(table 2 and table 3)

The composition of flammable biogas was determined though the use of chromatography. Flammability of gas was checked in a biogas burner .Then it was used to run a active engine model with almost few modifications [Figure no.2]

Carburetor was removed and nozzle assembly with a ball valve was used for adjusting air fuel ratio manually (Figure no 2).Biogas was fed to the nozzle assembly and air fuel ratio was adjusted manually for proper running of the engine.

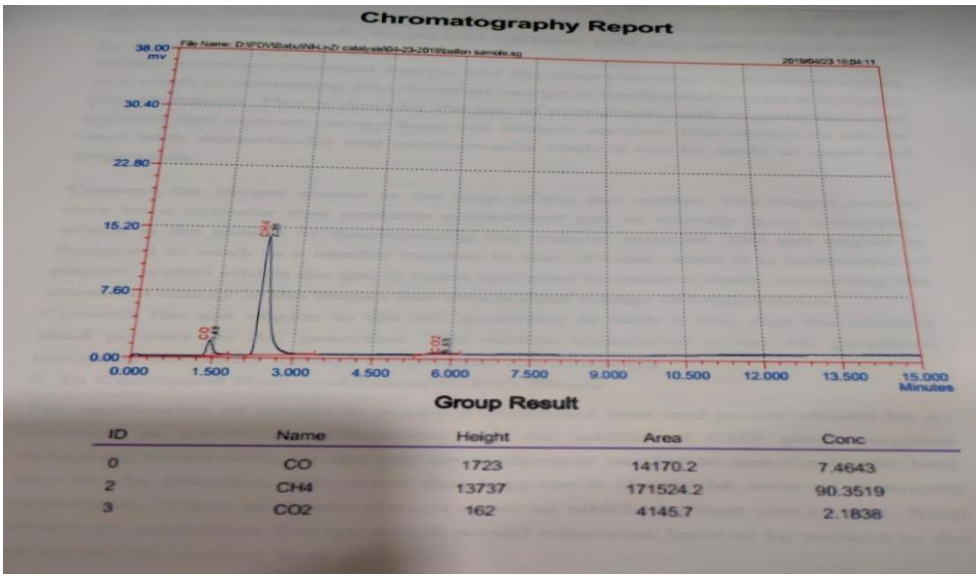
Running of stationary active engine is shown in video.

Table no.2 Chromatography report. Date.05/04/2019



Name	Retain. T	Height	Area	Conc.	Tail. Factor
CO	1.413	1820	12500.4	3.837	1.65
CH_4	2.273	22412	297866.0	91.421	3.29
CO_2	5.827	442	15450.0	4.742	1.37
SUM:		24674	325816.4	100.0000	

Table no.2 Chromatography report. Date.23/04/2019



RESULT AND DISCUSSION...

Table 1 shows the charge stock and decomposer ratio for gas production

Table 2 shows the result obtained from the Chromatography report that biogas obtained contains 3.837 % of carbon monoxide with 91.421% of methane and 4.742% carbon dioxide.

Table 3 shows Second Chromatography report that the gas contains 7.4643 % of carbon monoxide with 90.3519% of methane and 2.1838% carbon dioxide

This shows that Biogas with low carbon dioxide and highly methane concentration can be produced using waste decomposer. This gas further can be utilized for heat generation and for running of stationary petrol engines with less or no modification. Waste generated by biogas digester can be used as fertilizer .This waste decomposer can be used with cow dung and waste food products from hotels for renewable gas production and its utilization.

REFERENCES

(1) Ukpai,P,A, et al Adv. Appl. Sci. Res., 2012, 3(3): 1864-1869