Application of kitchen and mess waste for production of Biogas

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Abstract- *It is a organic waste treatment system in which the kitchen waste collecting from messes and utilized for better purpose like production of biogas. it is also known as septic system during this process the information was gathered on waste material and the production of biogas and their digestion .A mass balance gathered for our 91% material should entering the plant leave and the waste product of the kitchens and the digestion product in the presence of micro-organism. Anaerobic digestion of kitchen waste produced biogas. it is a very economical way of fuel production and a very eco friendly and also generate high quality renewable fuel. The kitchen food waste is collected from canteen, messes house or cities and it is feed stock for our reactor which is used as a raw material for production of biogas. it is microbial process or production of biogas.*

I. INTRODUCTION

Due to continuously increasing scarcity of petroleum (fossil fuel) coal etc. We need to find new sources of energy like renewable energy resource, solar energy, wind energy biogas all are renewable energy resources these all resources are ecofriendly and does not produce any type of pollutant but biogas is little bit different from other renewable energy sources and biogas is very beneficial because it does not require advanced technology for production and also very easy to apply and very simple to use.

In the production of biogas the kitchen food waste is the main raw material. And the kitchen waste are organic material having the high calorific value that's why the efficiency of methane production can be increased which means the cost of biogas production is reduced also the kitchen waste disposed for land filling which leads the pollution of ground surface and the ground water through leachate and also promotes the breeding of flies, mosquito, rats and other disease bearing vector which is harmful for human health.

II. BIOGAS

BIOGAS is produced by bacteria through the bio-degradation of organic material under anaerobic condition. Natural generation of biogas is an important part of bio-geological carbon cycle.

1. Characteristics of bio gas

Characteristics of biogas based on its chemical compositions and also depends upon the feed material or raw material biogas is able to replace the LPG / cow dung, firewood and biogas is lighter 20 % than the air. Biogas is excellent nutrient qualities than the normal fertilizer as it is in the form of ammonia and can be used as manure.

2. Principle of production of bio gas

Organic substances exist in wide variety from living beings to dead organisms. Organic matters are composed of Carbon(C),combined with elements such as Hydrogen(H),Oxygen(O),Nitrogen(N),Sulphur (S)to form variety of organic compounds such as carbohydrates, proteins & lipids. In nature MOs(microorganisms),through digestion process breaks the complex carbon into smaller substances.

Table 1.

Compound	Formulas	%
Methane	CH_4	50-75
Carbon dioxide	CO_2	25-50
Nitrogen	N_2	0-10
Hydrogen	H_2	0-1
Hydrogen sulphide	H_2S	0-3
Oxygen	O_2	0-0

There are 2 types of digestion process :-

1. Aerobicdigestion.
2. Anaerobicdigestion.

III. OBJECTIVE

1. Optimization of gas production
2. Comparison with conventional plants.
3. Effect of different parameters such as temperature, volatile fatty acid, volatile solid etc.

III. METHODOLOGY

Syringe method:-

syringe method was used for the measurement of amount of methane and carbon dioxide in our gas production. Syringe method fitted with tube and dilute sodium hydroxide (NaOH) solution was used for carbon dioxide percentage estimation, since NaOH absorb CO2 but does not absorbs methane.

Formula:-

Total solid (TS%):-
TS % = (Final weight/initial weight)*100
VOLATILE SOLID (VS %):-
VS % = (100-(V3-V1/V2-V1))*100

Where,

V1 = weight of crucible.
V2 = weight of dry residue and crucible.
V3 = weight of ash and crucible.

Volatile Fatty acid:-volatile fatty acids are fatty acid with carbon chain of six carbon or fewer. They can be created through fermentation in the intestine. Example include: acetate, propionate, butyrate

Formula:-

Total VFA content in mg/l acetate acid = (volume of NaOH titrated)*87.5

Experiment:-

We use 1 liter and 2 liter bottle of different set with different amount of kitchen waste and cow dung.

Table 2.

Set no./day	1st	2nd	3rd	4th	5th	6th	7th	8th	Average
1	30	35	20	10	-	40	25	10	23.75
2	80	150	120	50	-	60	90	115	89.37
3	85	75	58	35	-	20	70	100	60.02

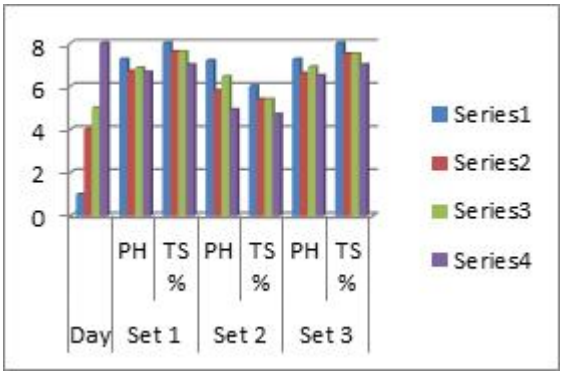

Figure 1.

After that we can found gas was produced inside the bottle. The 3 different set with different composition are used.

V. RESULTS AND DISCUSSIONS

In all of three set gas production occurs and gas burned with blue flame. Process continues, volatile fatty acid are produced which causes the decrease in PH of solution.

VI. DISCUSSIONS

From the result it has been seen that in set2 which contain kitchen waste produce more gas compare to other two set. In set2 with kitchen waste produces average 250.69 % more gas than set1 (with 200gm cow dung) and 67.5 % more gas than set3 (with 400gm cow dung).means kitchen waste produce more gas than cow dung as kitchen waste contain more nutrient than dung. So use of kitchen waste provides more efficient method of biogas production.

Table 3.

Day	Set1		Set2		Set3	
	PH	TS%	PH	TS%	PH	TS%
1	7.25	8	7.2	6	7.25	8
4	6.7	7.6	5.8	5.4	6.6	7.5
5	6.85	7.6	6.45	5.4	6.9	7.5
8	6.65	7	4.92	4.7	6.5	7

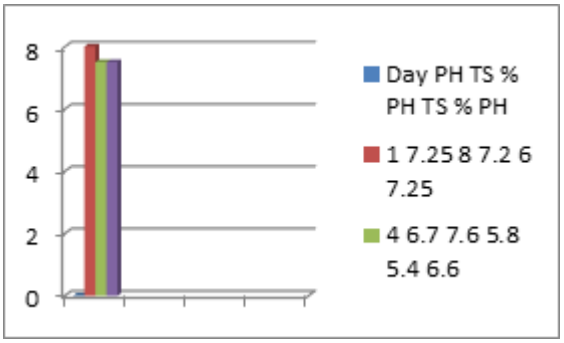

Figure 2. The output response of the raw material into the system

From result it has been seen that PH reduces as the process going on as the bacteria produces fatty acids. Here methanogens bacteria which utilize the fatty acids, is slow reaction compare to other so it rate limiting step in reaction. In set 2 which contains kitchen waste PH decreases highly means reaction is fast means hydrolysis and acidogenic reaction is fast as organism utilize waste more speedily than dung.

VII. CONCLUSION

In the application of kitchen and mess waste we can see that there are degradation of waste product in the experiment produces Biogas. There are many garbage and refuse waste coming out through mess and canteen the use of these wastes as production of biogas gives minimization of waste and also useful for cooking food. These is used in urban areas as well as cities and town because its save energy and electricity. It is eco friendly and pollutant free and good fulfillment for future resource.

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