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BIO GAS RECOVERY FROM ANAEROBIC DIGESTION PROCESS

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Abstract— In all institutes, industries and public sectors etc., where daily a large amount of kitchen waste is obtained which can be utilized for better purposes. Project was to Create an Organic Processing Facility to create biogas which will be more cost effective, eco-friendly, cut down on landfill waste, generate a high-quality renewable fuel, and reduce carbon dioxide & methane emissions. An attempt is made in our institution (M S Engineering College) where daily a large amount of kitchen waste is obtained which can be utilized as a bio-gas.
Keywords : biogas, bio-digester, anaerobic digestion process.

1. INTRODUCTION

Management Biogas production through anaerobic digestion (AD) is an environmental friendly process utilizing the increasing amounts of organic waste produced worldwide. A wide range of waste streams, including industrial and municipal waste waters, agricultural, municipal, and food industrial wastes, as well as plant residues, can be treated with this technology. It offers significant advantages over many other waste treatment processes. The main product of this treatment, i.e., the biogas, is a renewable energy resource, while the by-product, i.e., the digester residue, can be utilized as fertilizer because of its high nutrient content available to plants. The performance of the AD process is highly dependent on the characteristics of feedstock as well as on the activity of the microorganisms involved in different degradation steps. The conversion of organic matters into biogas can be divided in three stages: hydrolysis, acid formation, and methane production. In these different stages which are however carried out in parallel, different groups of bacteria collaborate by forming an anaerobic food chain where the products of one group will be the substrates of another group. The process proceeds efficiently if the degradation rates of the different stages are in balanced.

2. MATERIALS AND METHODS

Fresh cow dung is collected and mixed with water thoroughly by hand and poured into 500 litters digester. As it contains the required microorganism for anaerobic digestion. After that digester was kept for some days and gas production will be checked. After some days kitchen waste is added for checking gas production.
This digester contains the following composition.
500lit digester.
Cow dung + organic waste + water added.
NaOH & NaHCO3 added to increase/adjust pH.
Ratios:
1:6= cow dung : organic waste.
1kg of wet waste into 10liters of water. Temperature: 28-35°c
Composition of biogas:

Component	Concentration (by volume)
Methane (CH4)	55-60 %
Carbon dioxide (CO2)	35-40 %
Water (H2O)	2-7 %
Hydrogen sulphide (H2S)	20-20,000 ppm (2%)
Ammonia (NH3)	0-0.05 %

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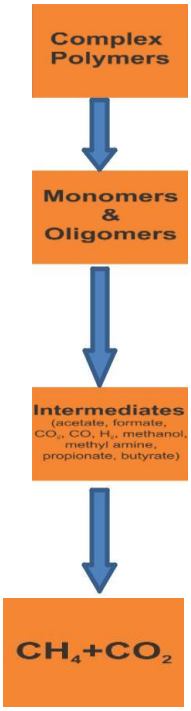
Nitrogen (N)	0-2 %
Oxygen (O2)	0-2 %
Hydrogen (H)	0-1 %

Flow diagram for biogas production:

HYDROLYSIS

ACIDIFICATION

METHANOGENESIS



3. DESIGN OF EXPERIMENT

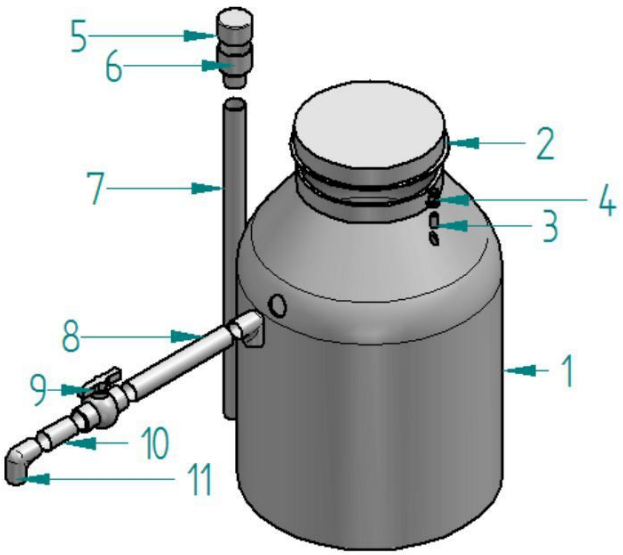


Fig1.1 3D-Model Fig1.2 Bio-digester

1.Tank 7.Inlet pipe

2.Tank cap 8.Outlet pipe 1

3.Connecter 9.Ball valve

4.Gas valve 10.Outlet pipe2

5.End cap 11.Elbow

6.Funnel

Assembly of the setup follows the fabrication and testing of the components required for the process. The bio-digester is placed where the setup is to be installed so as to conduct the experiment. The experiment is performed outdoors for safety. The bio-digester is carefully placed on the foundation. The next step involves carefully installing the bio-digester. Then carefully place the bio-digester in the center.

4. EXPERIMENTAL PROCEDURE

Planning of the biogas producing experiments, and the preparation of an applied fermentation technology and unit.
Collect the organic waste and cow dung.
Some additives (fruit marc) have acidic pH, so they can be applied only under certain conditions and in limited quantities in biogas systems.
The applied variants can provide favourable conditions for producing biogas, and, simultaneously, waste disposal can also be realized via biogas-production.
Maize-marc and fruit-marc as additives have the effect of an increased methane production, coupled with a stable gas composition.
The methane production of the given variants satisfies the conditions of utilization.

5. RESULTS AND CONCLUSION

Production rate of bio gas was obtained approximately to the value of about 0.4kg/day which is nearly to that of the expected value of 0.67kg/day.
From results 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 is rate limiting step in reaction.

Day	pH
1	7.25
10	6.7
20	6.85
30	6.65

Table 1.1 pH concentration

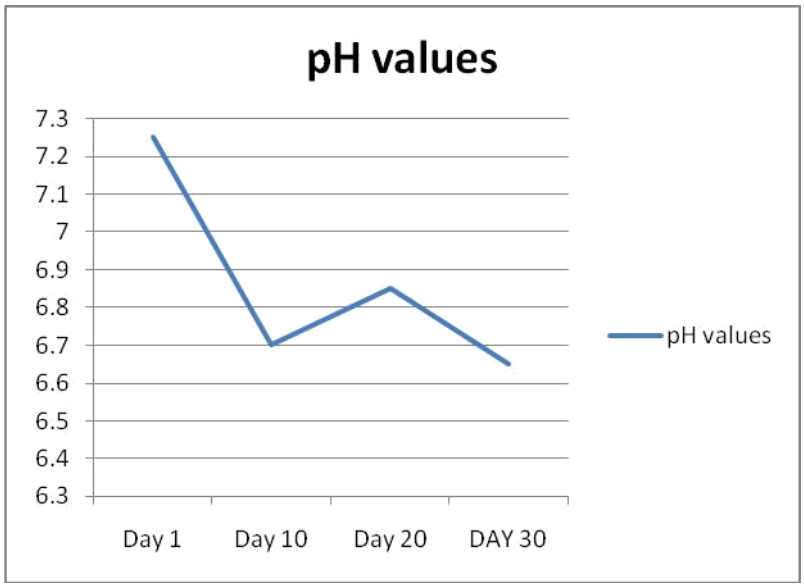


Figure1.3 Graph for pH v/s Days

From the graph it is observed that pH value is varing due to variation in temparature.
Further the rate of production of gas can be increased by fermentation.

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