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GENERATION OF BIOGAS USING FOOD WASTE

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Abstract – *In our institute we have 3 hostel and all having their own individual mess, daily a large amount of kitchen waste is obtained which can be utilized for better purposes. Biogas production requires anaerobic digestion . Project was to create an organic processing facility to create biogas which will be more cost effective , Eco-friendly , cut down on landfill waste, generation a high-quality renewable fuel, and reduce carbon dioxide and methane emissions. The bio gas yields have been determined using batch anaerobic digestion tests for a period of 42 days. Characteristic oscillation was observed in the rate of methane production, which. The total bio gas generated in the system over the experimental period was the sum of methane and carbon dioxide. Bio gas produced from the decomposition of food waste was a mixture of 76% methane and 24% carbon dioxide.*

Key Words: **Anaerobic digestion, Kitchen waste, Organic Manure, Cow dung**

1. INTRODUCTION

Biogas refers to a gas made from anaerobic digestion of kitchen waste. Methane is a clean energy one of the constituent of biogas which has a great potential to be an alternative fuel. Abundant biomass from various institutions could be a source for Methane production where combination of waste treatment and energy production. Objective of this study is to utilise the kitchen waste in a biogas digester to produce biogas which will be the alternative fuel for their kitchen energy need. This work was carried out to produce biogas in a Compact Water Plastic Tank with a fixed type, using different kitchen waste from the kitchen, hostel, and canteen in STJ institute of technology Engineering College.

1.2 PURPOSE OF WASTE WATER TREATMENT

Manufacturing of food items, chemicals ingredients and fat produces numerous by-products, solid wastes, high amounts of waste water containing different loads of pollutants and emissions into the bodies increases health risks for human beings and environment air. The uncontrolled release of effluents to natural water pollution. Effluents from raw hide processing food items, which produce rotten smell, crust or finished items, contain compounds of trivalent chemical compounds in most cases. Organic and other ingredients are responsible for high BOD (Biological Oxygen Demand) and COD (Chemical Oxygen Demand) values and represent an immense pollution load, causing technical problems, sophisticated technologies and high costs in concern with effluent treatment.

1.3. OBJECTIVES OF THE PRESENT STUDY

Anaerobic treatment is clearly suitable for India's tropical climate. The reduced cost brought about by lower power consumption are generally enough among all the waste treatment methods even if any returns of gas utilization are neglected.

1.4. SCOPE OF PRESENT STUDY

- 1.Solid and liquid waste of food is collected from kitchen and their characteristic has been studied.
- 2.Before discharging waste water to water bodies it has to be treated to reduce the Chemical Oxygen Demand, Sulfate content.
- 3.As a result of this treatment Biogas liberated can be used for domestic purpose.
- 4.The amount of land fill has also been considerable reduced.

2. MATERIALS AND METHODOLOGY

2.1. SOURCES AND GENERATION OF FOOD WASTE

Food waste which is collected from STJ Institute of Technology Engineering College canteen includes vegetables, fruits and other items. The treatment process of food waste products gives hazardous waste. The usage of chemicals are one of the main reason for this. The manufacturing of food items is a process that must be accomplished by adhering to strict controls of both the local and Federal food regulatory agencies. The items of food that are manufactured are as varied as the people they serve. Common staples, exotic delicacies, snack foods and ethnic specialties are all food items that go through a controlled and precise.

2.2 METHODOLOGY

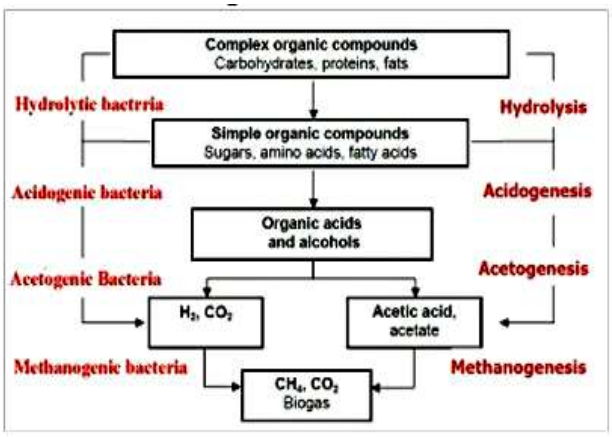
2.2.1 Anaerobic process takes-place in following 4 steps as follows;

Step I: Hydrolysis

Step II: Acidogenesis

Step III: Acetogenesis

Step IV: Methanogenesis



chat1 : Cycle representing anaerobic process

2.2 SAMPLE COLLECTION.

Samples for treatment of food waste, both solid and liquid were collected from STJ Institute of Technology Engineering College hostel and canteen. About 18kg of waste items collected are categorized as vegetables, fruits, rice, other food items and waste water which mixing together, forms semi solid state.

2.3 Results on various tests conducted for with cow dung slurry

Sl no	Properties	Influent	Effluent
1	pH	4.5	4.3
2	Conductivity	4.9	21.6
3	Alkalinity Phenolphthalein alkalinity as $CaCO_3$ (mg/l) Total Alkalinity as $CaCO_3$ (mg/l)	0 5	0 17
4	Acidity Methyl Orange acidity as $CaCO_3$ (mg/l) Phenolphthalein acidity as $CaCO_3$ (mg/l)	54 4	50 2
5	BOD	4.43	2.12
6	DO	9.85	5.42
7	Total solids	360	200

Table : 1 Results on various tests conducted

2.4 EXPERIMENTAL PROCEDURE

Experimental studies were carried out in batch reactors of 81lit capacity and made upcompact water plastic material. The effective volume of the reactors was maintained at 40lit .the reactor was provide with suitable arrangements for feeding, gas collection, draining residues. Experiments were carried out in the ambient temperature. Each reactor was added with 10lit sludge and diluted to 40lit of working volume. The characters of samples

The semi solid waste used in this study is collected from hostel and college canteen. The fresh Cow Dung Slurry was added to the above food waste to supplement the reaction process. It is used as a seeding material for the reaction process in the Anaerobic Sludge Reactor Effective micro organism collected from private company was used to accelerate the reaction process. Also yeast is added for fermentation process to take place.

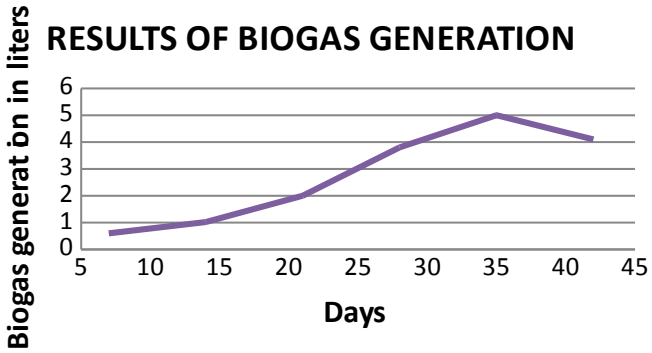
2.5 RESULT AND DISCUSSION

BIOGAS is produced in anaerobic conditions through bacterial reactions through the bio-degradation of organic materials. Natural generation of biogas is an important part of bio -geochemical carbon cycle. The production of methane during the anaerobic digestion of biologically degradable organic matter depends on the amount and kind of material added to the system.

Sl .no	Feed Stock in kg	Biogas generation in lit	Days
1	12	0.60	7
2	14	1.02	14
3	16	2.00	21
4	18	3.80	28
5	20	5.00	35
6	22	4.10	42

Table : 2 Result of biogas production

In 40 litre digester feedstock was placed up to 12kg and left for acclimatization for a week. After a week the gas generation was observed up to 0.6 litres. After checking the gas production we had increased the feed stock where gas generation observed on 14th day was up to 1.02 litres. This process was continued for further 4 weeks in which highest generation of gas was obtained on 35th day was up to 5 litres. On further addition of feedstock the. Gas production was observed in which the digester failed and gas liberation decreased from 5 to 4.10 lit



3. CONCLUSIONS

Decreased and effluent was acidic in nature which is the cause for the failure of generation of bio-gas. The complex compound from the in-fluent was broken down result in the decrease of BOD value . The DO of in-fluent was reduced. At the final stage the generation of bio-gas was decreased due to the formation of acidic nature in the effluent and it cause the failure in reactor.

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