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Biogas Production from Kitchen Waste

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Abstract: ***In India food waste produced as much as the whole of United Kingdom consumes, in an around 40% of food produced in India is wasted. According to the agriculture ministry, INR 50,000 Cr worth of food produced is wasted per year. Solid waste management is major issues in these areas and Present study is to convert this waste into useful burning gas. Kitchen waste is highly neglected area of the environment management in most developing countries. Kitchen waste produced largely weddings and banquets, Mess, Hotels etc. In our institute we have hostel mess with daily a large amount of kitchen waste is generated. In an around 200 liters waste produced per week, in that majorly Chapati, rice, meat, vegetable wastes. Organic processing facilities to create biogas which will be more cost effective and eco-friendly, cut down on landfill waste generated a high quality renewable fuel and reduce carbon dioxide &methane emission. The Biogas digester requires maintaining the alkalinity pH 7 to 8; in this digester of previous cow dung slurry is fed kept for 15 days, after generating biogas we feed cocked and grinded kitchen waste. Maximum enhancement of biogas maintains the digester temperature in-between range of 37 to 45^{0}C. Generated biogas used as burning gas.***

Keywords: Biogas, Kitchen waste, anaerobic digestion, Energy source.

I. INTRODUCTION

Kitchen waste is highly neglected area of the environment management in most developing countries. And developing nation now seriously consult with the consequence in proper handle in kitchen waste .kitchen waste is a organic material and this having calorific value and nutritive valve to microbes, this efficiency of methane production can be increased by several order of magnitude as said earlier the is organic material is higher efficiency and size of reactor and cost of biogas production is reduced kitchen waste is disposed in landfill to the cause the public and human being for health hazards and diseases like malaria ,cholera ,hypoid and this is not only groundwater through further promotes the breeding of flies ,mosquitoes ,rats and other diseases bearing vectors and it is the unpleasant odor and methane which is a major greenhouse contributing of global warming [1].

This kitchen waste problem successfully with the help of methane, now this not been benefited because of ignorance of basis science like output of work dependent on energy available for doing that work.

This fact current practices of using low calorific inputs like cattle dung ,distillery effluent , municipal solid waste ,in biogas plants highly inefficient and the we can make this system efficient digestion is controlled biological degradation and this is allows efficient utilization of biogas that is approximately 60% methane and 40% carbon dioxide for energy generation. Anaerobic digestion of kitchen waste is achievable but different types ,composition of food waste is varying degrees of methane yield and the effect of mixing various types of food and the their proportions.

In GSITs hostel kitchen waste will be done in eco friendly and cost effective way. The calculating the cost effectiveness of waste disposal we have to think more then monitory prospects.

The dumping of food in place and making the place unhygienic can be taken good care of .it adds to value of such biogas plant. Using the natural process like microorganism's kitchen waste and biodegradation waste via paper, pulp can be utilized.

Anaerobic digestion is a promising method to treat the kitchen waste.

This anaerobic digestion is a treatment of animal dung is common in rural parts of developing countries in this information of technical and operation of treatment of organic solid waste is limited parts there are many factor the design and performance of anaerobic digestion . Physical and chemical character of the organic waste are important for designing operation digestion because the affect the biogas production and process stability during anaerobic digestion. The moisture content, volatile solids, nutrient contents, practices size and bio gradation. The biogas or methane is measured by the amount of biogas or methane can be

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II. HOTEL SURVEY

The present survey is to make the efficient use to the waste generated and to protect it from environmental pollution so the survey is being conducted in various hotels of Karwar city.

A. Amrut Hotel

This one of the hotel in Karwar city this hotel tradition is as old Karwar itself as it is being famous for both the vegetarian and non vegetarian food and wastages from it is very large encountered in this hotel. In this hotel wastages of vegetable during cutting 5 to 7 kg per day and afternoon lunch wastages takes place around 6 to 10 kg and the dinner wastages takes place around 6 to 10 kg this hotel overall wastages encountered in this hotel is approximately 15 to 20 kg per day.

B. Premier Hotel

This is one of the most hotel in Karwar city with high quality food which involves both the veg and non-veg. it is located at Karwar city bus stand road the during survey we noticed that about nearly 20 to 25 kg of wastages of food are have been encountered in this hotel. in this hotel wastages that comes from after breakfast is around 5 to 6 kg and wastages encountered during preparation of lunch food is nearly 3 to 4 kg such as vegetables cutting wastages, non-veg wastages and the wastages encountered after the lunch such as food wastages that have left by customer is around 7 to 8 kg the wastages that comes from dinner time is around 7 to 8 kg the overall wastages is the 15 to 20 kg wasted.

C. Savita Hotel

This is one of the most hotel in Karwar city located in market. It involves breakfast and vegetarian foods. high standard quality foods have been provided by this hotel as many people visit this hotel wastages encountered in preparation of breakfast items is around 2 to 3 kg such as vegetable and wastages involved in dinner time is around 7 to 9 kg which involves rice left by the customer as we observed that total amount of food mad in one day is nearly above 70 kg and among 15 to 20 kg is being wasted

D. Karavali Hotel

As this hotel is being located in front of bus stand large number of travelers or say passenger visit this hotel for their meal as in this hotel breakfast as well as afternoon meals and night meals are also available in this hotel both vegetarian and non vegetarian foods are been prepared. During preparation of breakfast vegetables is around 2 to 3 kg after the breakfast wastages encountered is nearly 4 to 5 kg. during the preparation of afternoon meals is around 2 to 3 kg waste such as vegetables and fish waste after the lunch waste encountered is around 5 to 6 kg and the evening snacks waste is around 1 kg and the dinner waste is around to 3 to 4 kg the overall waste is 45kg and wastages that take place is around 10 to 12 kg.

E. UDUPI Hotel

Udupi hotel as name suggest that food prepared in this hotel contain only vegetarian foods as it provides morning breakfast noon evening snacks night dinner the large people visit this hotel for their day to day meal wastages that takes place in this hotel. His hotel preparation of morning breakfast waste encountered is around 1 kg and afternoon meals wastages encountered is around 4 to 5 kg around which contain rice and targetable wastages and evening snacks and high meal wastages is around 5 to 6 kg and the total amount of food prepared is around 40 to 50 kg and waste formed is around 10 to 12 kg.

Table 1: kitchen waste produced per day

Hotel names	Kitchen waste per day
Amrut hotel	15 to 20kg
Premier hotel	14 to 18kg
Savita hotel	15 to 20kg
Karavali hotel	10 to 12kg
Udupi hotel	10 to 12 kg

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F. Gsit College Hostel Mess Survey

As the survey conducted in our hostel, the waste generated approximately around 25 kg/day of waste is generated, as per the calculation 200 liters of waste is thrown out for a period of one week.

Cooked meals (Rice, Chapati, Vegetables): 25 liters/day

Uncooked Vegetable waste: 15kg/day

Fish and chicken wastage: 5kg on Friday and Tuesday

The waste contain the cooked rice, vegetable and non-vegetable waste. This waste is crushed by mixing grinder and slurry was mixing with water for biogas digester.

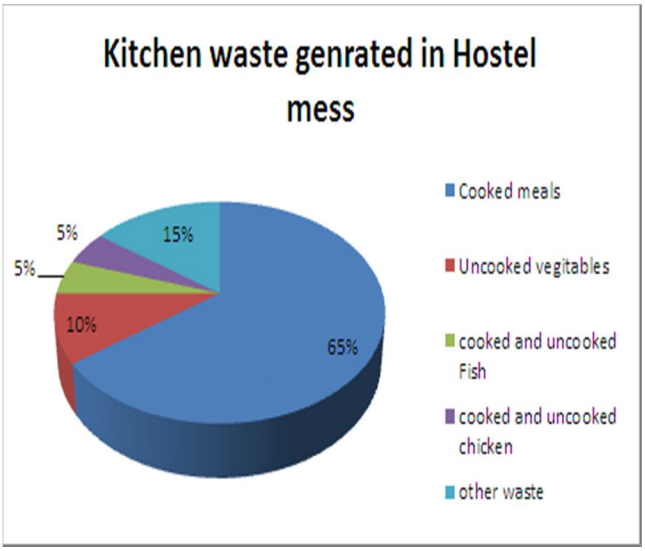


Fig –1 Major waste produced in GSIT hostel

III. METHODS AND METHODOLOGY

A. Biogas Production

Biogas is produced by bacteria through the bio degradation of organic material under anaerobic conditions and the natural generation of biogas is an important part of bio geochemical carbon cycle and its can be used both in rural and urban areas.

Table -2 composition of biogas

Component	Concentration (by volume)
Methane	50-60%
Carbon dioxide	35- 40%
Water	2-7%
Hydrogen sulphide	20-20,000 ppm (2%)
Ammonia	0-0.05%
Nitrogen	0-2%
Oxygen	0-2%
Hydrogen	0-1%

B. Characteristics of Biogas

Composition of biogas depend upon the material and biogas about 20% lighter than air & colorless gas that burns with blue flame similar to LPG gas and the calorific value is 20 MJ/m3 and it usually burns 60% efficiency in a conventional biogas stove. This gas is useful as fuel to subtitle firewood, cSw dung, petrol, LPG, diesel, electrical, depending on the nature of the task, and local supply condition sand constraints.

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Biogas digester system provides are the organic waste and after anaerobic digestion that is superior nutrient qualities over normal organic fertilizer ammonia can be used as manure anaerobic biogas is also function as wasted disposal system and the particularly for human waste and can therefore the potential for the environmental contamination and the spread pathogen and diseases bacteria . Biogas technology is the particularly valuable in agriculture residual treatment of animal excreta and kitchen refuse.

Table-3 Properties of Biogas

Energy content	6-6.5kwh/m^3
Fuel equivalent	0.6-0.61 oil/m^3biogas
Explosion limit	6-12%biogas in air
Ignition temperature	650-750C
Critical pressure	75-89bar
Critical temperature	-82.5C
Normal density	1.2kg/m^3

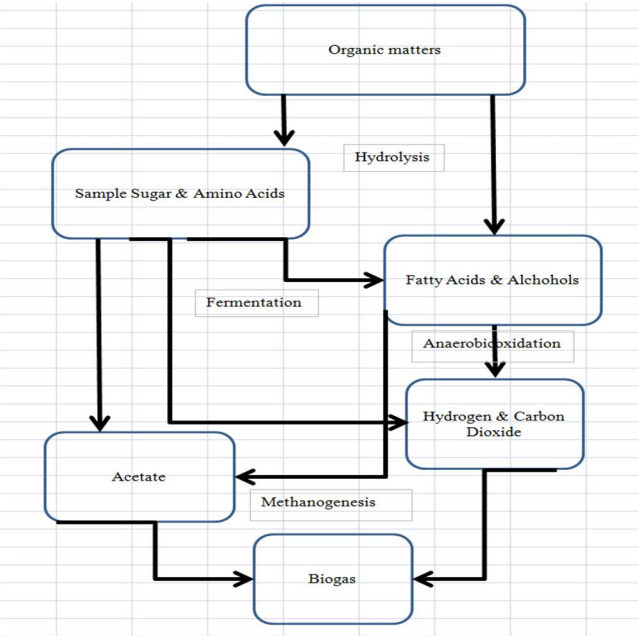


Fig-2 Process flow diagram for Anaerobic Digestion

1) *Hydrolysis:* this first step is the organic matter is enzymolsed externally by extra cellular, cellulose, mylase, lipase of microorganisms. Bacteria are the long chain of complex carbohydrates, protein and lipid into small chain. For example, polysaccharide is converted into monosaccharide.
2) *Acidification:* producing bacteria are involved in this step are converted to inter mediate of bacteria into acetic acid, hydrogen and carbon dioxide this bacteria anaerobic grow under acidic condition. They used dissolved o_2 or bounded-oxygen. The acid producing bacteria create the anaerobic condition these essential producing microorganisms. also they are reduced the compound with molecular weight in total alcohol, organic acid, amino acid, carbon dioxide, hydrogen sulphide and trace of methane since bacteria alone are not capable of sustaining that type of reaction.
3) *Methanogenesis:* producing bacteria is the involved in the third step this is the decompose compound having glow molecule weight they utilize hydrogen, carbon dioxide and acetic acid to form methane and carbon dioxide. This is under natural condition, CH_4 producing microorganisms occur to the extent that anaerobic condition is provided. They are basically are anaerobic and very sensitive to environmental changes this metnanogenetic is belong to the bactergenus that is to a group of bacteria with heterogeneous morphology and lot of common biochemical and the molecular biological properties are distinguished from the bacteria[4].

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Fig: Installation of Biogas plant in our institute capacity about 750 liters under in progress.

IV. CONCLUSION

A. Presently major hotels in Karwar city kitchen waste produce around 200 kg per day. Required around 5 tonnes capacity biogas plant for complete utilization of kitchen waste.

B. In our Institute the kitchen waste generated approximately around 200 liters of waste is thrown out for a period of one week.

C. Installation of biogas capacity in our institute for complete utilization kitchen waste produced, capacity of biogas plant is 750 liters.

D. Generated biogas used as a burning fuel for mess due this we can save around 3 to 4 LPG cylinders per year.

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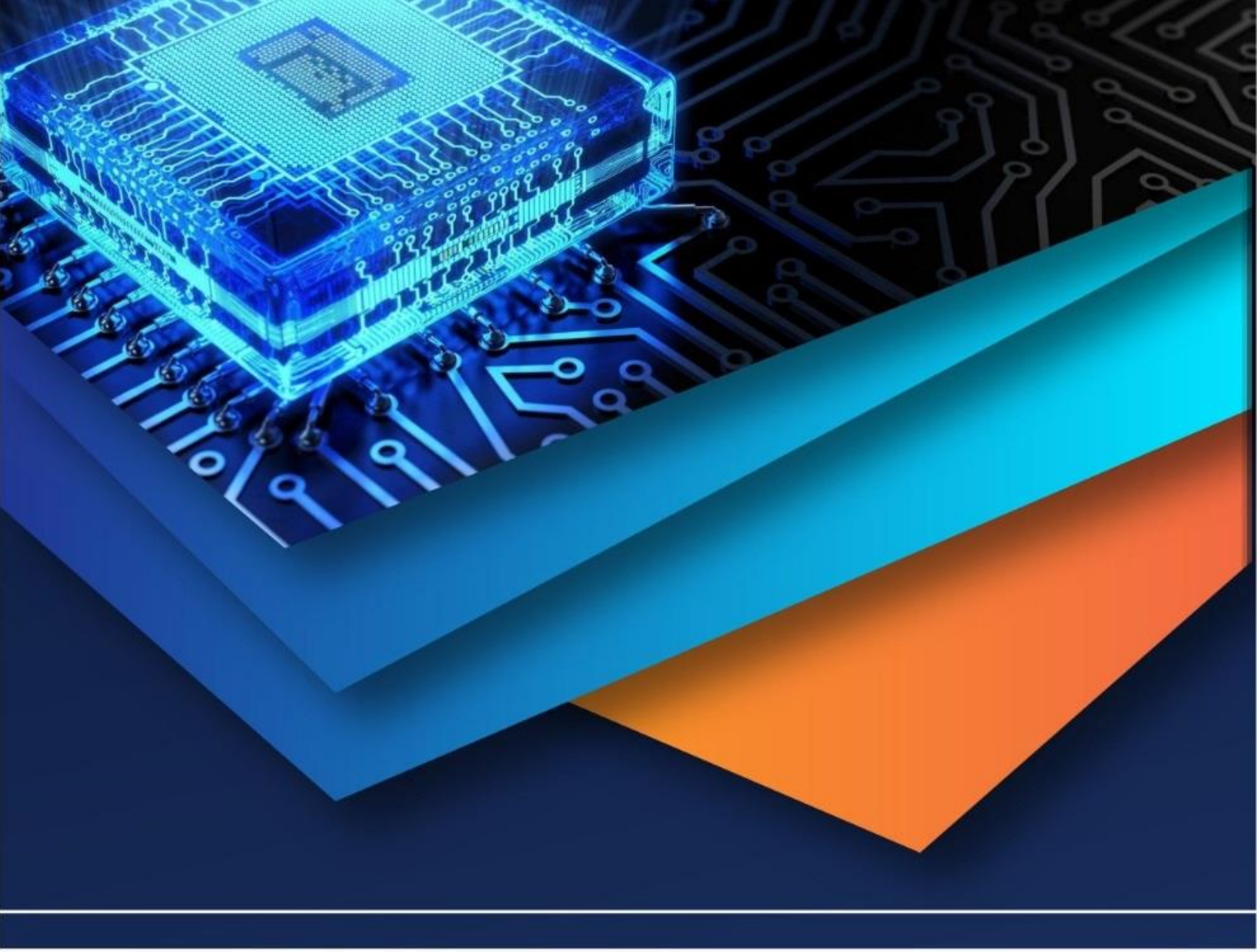
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