IOSR Journal of Mechanical and Civil Engineering (IOSR-JMCE)
e-ISSN: 2278-1684, p-ISSN: 2320-334X
PP 29-31
www.iosrjournals.org

INNOVATIONS IN GENERATION OF BIO-GAS FROM KITCHEN FOOD WASTE AND COW DUNG

V. D. GUJALWAR[1], M. IQBAL[2]
[1](Assit. Professor, Dept of Civil Engg.,Jagdambha College of Engineering, Yavatmal, Maharashtra State, India)
[2] (Professor of Civil Engg, PRMITR, Badnera, Maharashtra State, India)

ABSTRACT :*A study was conducted on the production of Bio-gas from Kitchen food waste and from cow dung and results are presented in this paper. This paper gives an idea and state of art innovations and research in the field of waste digestion and utilization of wasteful energy.*
In a 20 liters air-tight anaerobic digesterbacteria were flourished and used for digestion of kitchen food waste and cow dung. Tremendous amount of Bio-gas was found to be produced which can be utilized for domestic purpose.

Keywords :*anaerobic, bacteria, Bio-gas,digester, innovations, kitchen etc.*

INTRODUCTION

Organic matter present in wastes and in sludge can be degraded biologically by using Anaerobic bacteria. Anaerobic digestion has been used for stabilizing waste water sludge for over 60 years. However the process is unreliable. The lack of sufficient training has contributed to the unsatisfactory use of the anaerobic digestion process.

The key to efficient anaerobic digestion is to develop and maintain a large stable, viable population of methane forming bacteria. It is necessary to provide: (1) Adequate contact between the bacterial population and appropriate nutrient sources in the substrate (i.e. efficient mixing) ; (2) a suitable uniform environment; and (3) sufficient bacterial retention time. Most problems encountered in anaerobic digestion are associated with no uniform, unstable, or other unusual conditions in the feed or in the reactor itself. Proper attention to these three key factors will minimize such problems.
To begin the discussion of process fundamental, it is useful to formulate a check list of key factors that govern bacterial growth. Favorable condition relative to all of the following factors will maximize the chances for achieving optimum design and efficient operation:(1) pH (2) Temperature control (3) Homogeneous mixing (4) Concentration of proper nutrients (5) absence (or assimilation) of Toxic materials (6) Feed characteristics (7) Retention time.

The Bio-gas (mainly mixture of methane and Carbon dioxide) is produced / generated under both, natural and artificial conditions. However for Techno-economically-viable production of biogas for wider applications the artificial system is the best and convenient method.
A study was conducted on the production of Bio-gas from Kitchen food waste and from cow dung and results are presented in this paper. This paper gives an idea and state of art innovations and research in the field of waste digestion and utilization of wasteful energy.

1. Stability And Control Of Anaerobic Digestion :

The stability of anaerobic digestion process may be defined in terms of its response to periodic changes in influent characteristics. The main cause of instability and ultimate failure of digestion process are hydraulic , organic and toxic overloading and thus either the design must provide inbuilt mechanism for ensuring process stability or a suitable digester control strategy must be identified out of possible alternatives i.e, flow reduction, base addition, organism recycle and gas scrubbing, and recycle.

One of the major problem associated with the anaerobic digestion process is its poor record with respect to process stability. In some case, The difficulty is caused by an overloaded, improper design or equipment failure. In other cases the problem is the

result of poor operation.

Anaerobic digestion is inheritably an unstable process. This is not inconsistent with report that some digesters operate trouble free few extended periods, as it is also true that many do not. Hence the important thing in anaerobic digester becomes and of the proper balance between the two groups of bacteria. The methane formation is the rate limiting stage and unstability.can result from any material or effect that increase with methane formation According to Graef S. P.and Andrews J. F. (1947) the maximum stability is achieved by-

i) Increasing the effective residence time.
ii) Maintaining a high carbonate alkaline concentration, which
iii) provide a buffer against pH changes .
iv) Increasing the influent substrate concentration.
v) Recycling the digester stage.
vi) Loading the digester as frequently as possible.

3 Installation

In this research on gas production from Kitchen food waste and cowdung slurry was observed. For bacterial organism Fresh septic tank effluent and cow dung slurry which contain the required microorganism for anaerobic digestion were collected and poured into 20 lit Digester.

The digester was installed in Environmental Engineering laboratory of CivilEngg. Department, at Jagadambha College of Engineering and Technology, Yavatmal, India. A 20 lit. Airtight container is used as a digester as shown in Fig.1 and Fig.2..

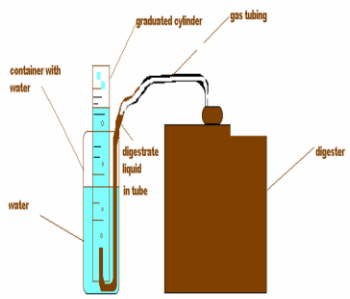

Fig. 1 Set Up of Anaerobic DigesterFig.2. Photo of Anaerobic Digester with lab stirrer

4 Operation Of Digester :

- **1st step:**-200 ml of fresh septic tanks effluent waste water in 20 liter airtight container bottle(AD) was taken.
- **2nd step:-** Then 200 ml, of cow dung was mixed with 100 ml fresh water for cowdung slurry in 20 liter airtight container bottle(AD) .
- **3rd step:**-On next day 50 ml starch made up from potato chips was added and starch was added everyday for seven days for growth and increase the population of bacterial organism.
- **4th step:**-On 3rd day after mixing starch Uria and Superphosphate one gram single dose were added in diluted in 50ml of water and feeded into Anaerobic digester to accelerate the process of bacterial population.
- **5th step:**-On 8 day a kitchen food waste slurry of 250 ml was added in Anaerobic Digester bottle for decomposition. On 9^{th} and 10^{th} day 250 ml kitchen food waste slurry was added and on 11^{th} and 12^{th} day 500 ml kitchen food waste slurry was added.
- **6 th step:**-After filling of half bottle Bio-gas produced was measured by inverted water displacement method as shown in Fig.2. Then 500 ml digested sludge was removed from the outlet of close anaerobic digester.Then mixed fresh kitchen waste food slurry of 500 ml was added inthe digester The pH and Temperature for inlet and outlet slurry were measured.

This above process was allowed to continued until the optimum production of gas was observed. Different proportions of food waste and cow dung were taken to record observations.

5. Conclusions :

The following conclusions are drawn from the study:

- Effective mixing of extra bacterial seed improves digestion of waste and production of bio-gas.
- The value pH & Temperature goes on decreasing with digestion of sludge.
- It was found that the amount of biogas produced has increased by use of lab stirrer for homogeneous mixing of substrate with bacteria available in anaerobic digester.
- The amount of Cumulative biogas produced for 500 ml food slurry has increased by use of lab stirrer as compared to without use of lab stirrer was about 75 ml for successivetwelve days.
- It was found that the amount of biogas has increased with increasing proportion of cow dung in food slurry.
- It was found that after addition of 25ml of cow dung with 475 ml food slurry, the quantity of cumulative biogas produced has increased about 5ml as compared to 500 ml food slurry without inclusion of cow dung slurry.
- It was found that after addition of 50 ml of cow dung with 450 ml food slurry, the quantity of cumulative biogas produced has increased about 70 ml as compared to 500 ml food slurry without inclusion of cow dung slurry.
- It was found that after addition of 75ml of cow dung with 425 ml food slurry, the quantity of cumulative biogas produced has increased about 110 ml as compared to 500 ml food slurry without inclusion of cow dung slurry.
- It was found that after addition of 100 ml of cow dung with 400 ml food slurry, the quantity of cumulative biogas produced has increased about 145 ml as compared to 500 ml food slurry without inclusion of cow dung slurry.
- It was found that with increasing the proportion of cow dung by 25 ml in food slurry, the average biogas increased should be 40 ml.
- In this investigation of kitchen waste, it is found that effect of mixing on an anaerobic digestion is advantageous on an effect of pH, effect of temperature, because in the effect of mixing with the help of stirrer, the contact between the substrates and the bacteria takes place in proper way due to that growth of bacteria as well as bacterial enzymes increases.

ACKNOWLEDGEMENT :

We are thankful to our friends who have helped and encouraged us for this research.

REFERENCES

Books:

[1]K.M.Mital (2007)," Biogas Systems"(Policies,Progress and Prospects) *Published By New Age International(P) Limited.*

[2] D.Mukhergee,S.Chakrabarti (2005), "fundamentals of RENEWABLE ENERGY SYSTEM".*Published By New Age International(P) Limited.*

[3] Rajesh K. Prasad (2008),"Non Conventional Energy Sources " *Published By Jain Brothwrs (New Delhi)*

[4] Metcalf and Eddy (1979), "Waste Water Eneering.Treatment,disposal and Reuse" *By Tata McGraw Hill Publishing Co. Ltd.New Delhi.(1979)*

Papers:

[5] Karve .A.D. (2007), "Compact biogas plant, a low cost digester for biogas from waste starch.",*http://www.arti-india.org*.

[6] Karve of Pune A.D (2006) "Compact biogas plant compact low-cost digester from waste starch",*www.bioenergylists.org.*

[7] Lusk, P. (1998),"Methane recovery from animal manures. The current opportunities casebook",*NREL, Golden, Colorado.pp. i to 7-3.*