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"STUDY OF REACTOR CONFIGURATION ON BIOGAS PRODUCTION"

***RAHUL CHAVAN*[1]**
***MAYUR MORE*[2]**
***SANTOSH SAWANT*[3]**
***VAIBHAV JAMDAR*[4]**
***MAYUR MATKAR*[5]**
***SIDDHESHWAR GAJARE*[6]**

[1,2]Student Of Department of Civil Engineering, SCSCOE, Dhangwadi, Pune, India
rhlchavan205@gmail.com
mayurmore289@gmail.com
santoshsawant217@gmail.com
siddheshwargajare1@gmail.com

ABSTRACT—

Biomass resources such as cattle dung, agriculture wastes and other organic wastes have been one of the main energy sources for the mankind since the dawn of civilization. There is a vast scope to convert these energy sources into biogas. Biogas production is a clean low carbon technology for efficient management and conversion of fermentable organic wastes into clean cheap & versatile fuel and bio/organic manure.

Biogas obtained by anaerobic digestion of cattle dung and other loose & leafy organic matters of biomass wastes can be used as an energy source for various applications namely, cooking, heating, space cooling and refrigeration, electricity generation and gaseous fuel for vehicular application. The country ranks second in biogas utilization. Biogas can be generated and supplied round the clock in contrast to solar and wind, which are intermittent in nature. Biogas plants provide three-in-one solution of gaseous fuel generation, organic manure production and wet biomass waste disposal/management.

Biogas is a product of bio-methanation process when fermentable organic materials such as cattle dung, kitchens waste, poultry droppings, night soil wastes, agricultural wastes etc. are subjected to anaerobic digestion in the presence of methanogenic bacteria.

KEYWORDS: *Reactor, Biogas*

INTRODUCTION

"Super challenges" of 21st century is to provide clean and healthy environment as well as fulfillment of energy demand, a renewable energy supply because of depletion of Earth's fossil fuel resources. The current way to produce, convert and consume energy throughout the world is not sustainable. Majority of existing practices of energy production consume non-renewable raw material for energy production such as coal, petroleum products which leads to release of pollutants in the environment.

A sustainable society requires renewable energy applications, reduction of dependency on fossil fuels and provide healthy environment. Wastewater treatment is an area in which those goals can be achieved simultaneously. As a result, there has been a trend shift recently, from disposing of waste to utilize it.

Renewable energy sources that meet domestic energy requirements play an important role in the energy and against a potential of12–17 million [Ravindranath 2009]. Biogas technology has brought benefits to the environment, economy and energy conservation. The development of sustainable biogas energy relies on the availability of local resources as a feed, environmental concern, and the local societal and economic conditions [Yanfei et. al, 2014]. The national project on biogas development was set up in1981 for the promotion of biogas plants using cattle dung and other biomass waste to generate methane for house hold cooking and lighting [Yanfei et. al, 2014].

The waste treatment processes can be made sustainable if energy and other by-products are recovered during treatment. Hence there is a need of paradigm shift in the concept of waste treatment; instead of treatment it can be considered as recourses recovery process. In an anaerobic waste treatment, the microbial fermentation of organic matter present in the wastewater has a potential to produce biogas

(CO2 and CH4), bio-ethanol, hydrogen gas and electricity. Considering glucose as the principal building block of biomass, the stoichiometric reactions of different bi-products are shown below [Lens et. al 2005].

For many years the basis behind using biogas technology was the search for environmental friendly sources of energy. With passage of time, it gains additional importance as technology for solid and liquid waste treatment. In developing countries biogas addresses the problems of scarcity of firewood, indoor air related health problems due to burning of biomass and lack of efficient and affordable lighting sources. It can substitute chemical fertilizers, improve soil and boost agricultural production. Environmentally, it can save fuel wood and through that help save vulnerable forest, soil, water and clean up the environment. In rural areas it reduce the use of forest resources for household energy purposes and thus slow down deforestation, soil degradation and resulting natural catastrophes like flooding or desertification. [Khoiyangba, 2011].

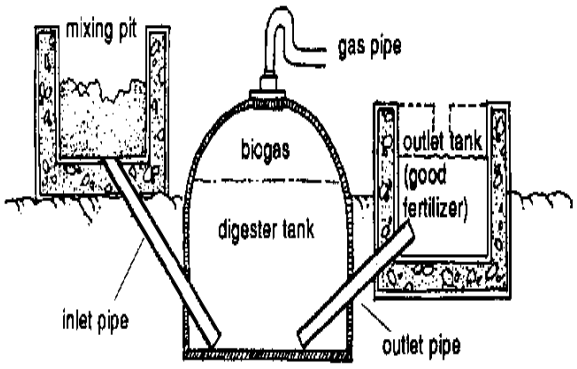
METHODOLOGY:

3.1 Methodology Adopted for Preliminary Study:

The study was conducted in close accordance with the objectives. Three biogas plants were selected randomly to understand the working and biogas technology as a whole.

3.2Features

- The Dimensions of biogas plants are
  - a)Tank- outer dia.-2m
    Inner dia-1.7m
  - b) Digester(Dome)-1.6m
  - c)Height -3m
  - d) Height of Dome-1m
- The primary feedstock for anaerobic digestion is cow dung.



Floating-Drum Plant

Results and Discussion

We took 2 plants of floating dome which were selected randomly .the readings were taken on morning and evening i.e. on deflection of floating dome.

1 Kg of dung can produce 40 liters of gas.

Volume of biogas plant (V) = 6.03m3

Water to Dung ratio is 1: 1

Hydraulic Retention Time (HRT) is 40 days

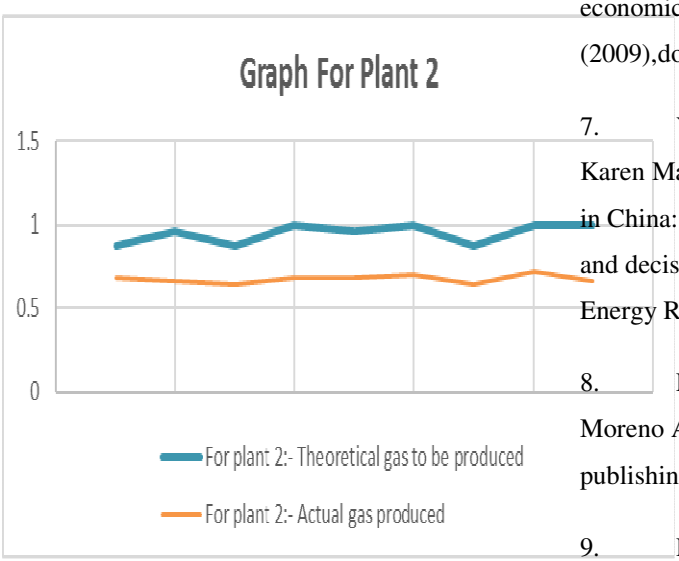
Therefore feed required is calculated as V/40

Therefore cow dung required V/40*2

Table No. 2 (floating dome plant)

Day	Morning Height* Deflected Height	Evening Height*	Feed in kg	Theoretical gas to be produced	Actual gas produced
1	0.4	0.64	0.34	22	0.88
	0.68				
2	0.37	0.70	0.33	24	0.96
	0.66				
3	0.42	0.74	0.32	22	0.88
	0.64				
4	0.35	0.69	0.34	25	1.00
	0.68				
5	0.34	0.68	0.34	24	0.96
	0.68				
6	0.37	0.72	0.35	25	1.00
	0.70				

7	0.36 0.64	0.68	0.32	22	0.88
8	0.36 0.72	0.72	0.36	25	1.0
9	0.35 0.66	0.68	0.33	25	1.0



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