

## Biogas Generation by Biogas Digester: A Major Source of Energy

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### Abstract

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Biomass is the major source of domestic energy for both rural and urban areas in India. This biomass can be converted into biogas by many methods, this paper includes the knowledge of biogas process and biogas plants digester. In India Day by day the energy demands is increased and our sources i.e. oil, fuel, wood, coal are decreased so we can used a renewable energy source biogas. In this paper we shows the various types of plans and biogas is easily produced by many digesters.

**Keywords:** Biomass, Biogas, Digester, Biogas plants, Gases, Sources.

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### 1. Introduction

Biogas is the mixture of gas produced by methanogenic bacteria while acting upon biodegradable materials in an anaerobic condition. Biogas is mainly composed of 50 to 70 % methane, 30 to 40 % carbon dioxide (CO<sub>2</sub>) and low amount of other gases as shown in Table 1.1.

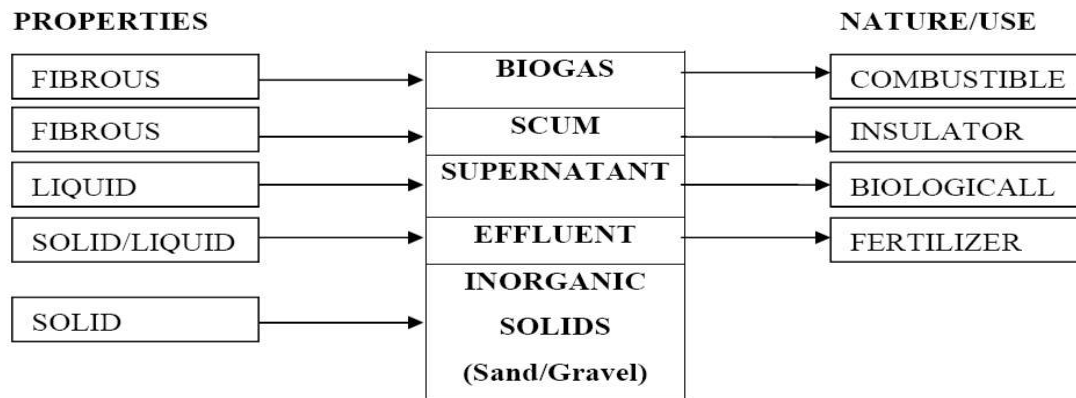
Biogas is about 20 percent lighter than air and has an ignition temperature in the range of 650 to 750 °C. It is an odourless and colourless gas that burns with clear blue flame similar to that of LPG gas. Its calorific value is 20 Mega Joules (MJ) per m<sup>3</sup> and burns with 60 percent efficiency in a conventional biogas stove.

Substances	Symbol	Symbol
Methane	CH <sub>4</sub>	0-70
Carbon Dioxide	CO <sub>2</sub>	0-40
Hydrogen	H <sub>2</sub>	5-10
Nitrogen	N <sub>2</sub>	1-2
Water vapour	H <sub>2</sub> O	0.3

**Table 1.1: Composition of biogas**

## 2. Biodigesters

The biodigester is a physical structure, commonly known as the biogas plant. Since various chemical and microbiological reactions take place in the biodigester, it is also known as bio-reactor or anaerobic reactor. The main function of this structure is to provide anaerobic condition within it. As a chamber, it should be air and water tight. It can be made of various construction materials and in different shape and size.



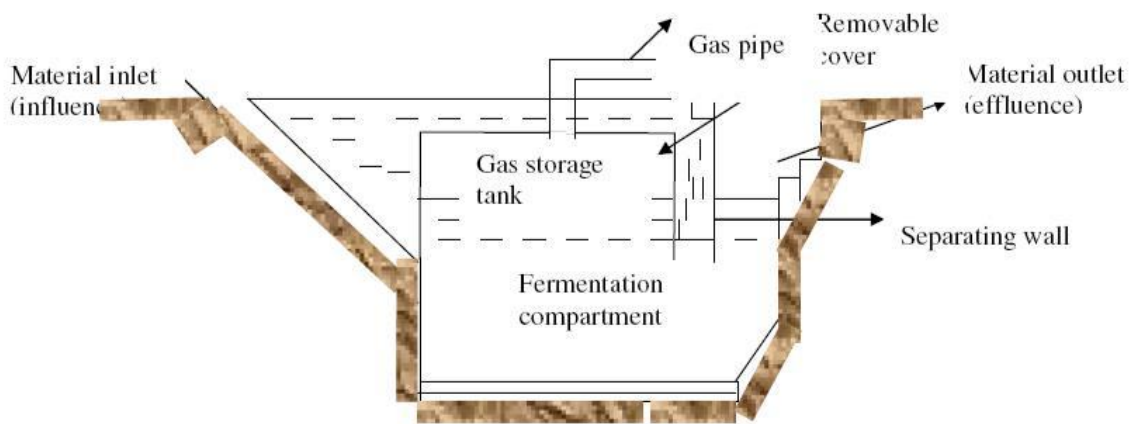
**Table 2.1 Anaerobic decomposition of organic material in biogas digesters**

The various stages of decomposition and the forms of the material at each stage are shown in figure. The inorganic solids at the bottom of the tank are rocks, sand, gravel, or other items that will not decompose. The effluent is the semisolid material left after the gases have been separated. The supernatant is biologically active liquid in which bacteria are at work breaking down the organic materials. A scum of harder-to-digest fibrous material floats on top of the supernatant. It consists primarily of plant debris. Biogas, a mixture of combustible (burnable) gases, rises to the top of the tank.

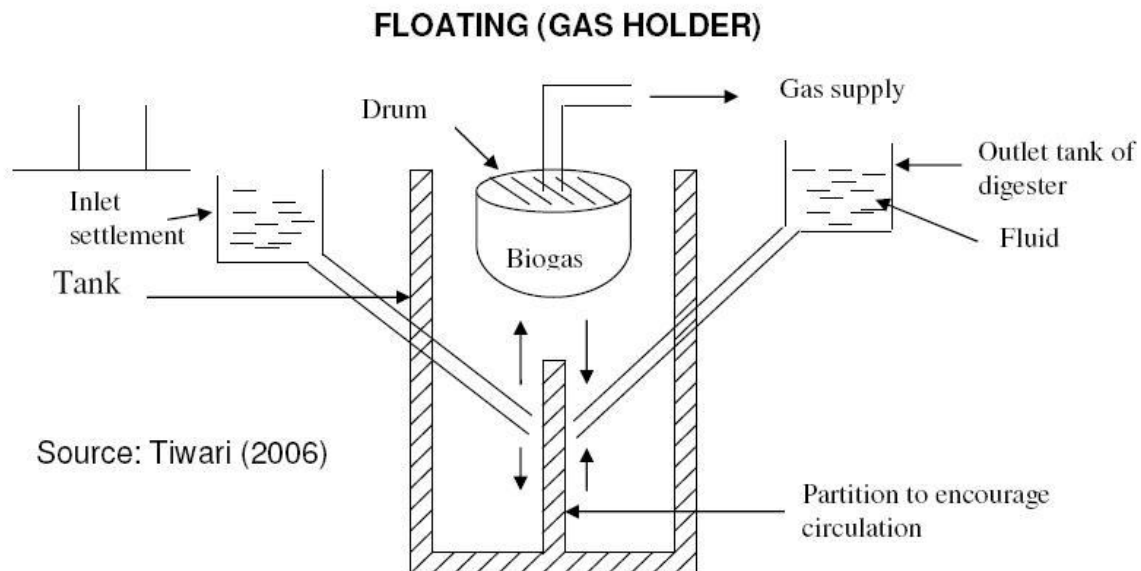
The largest, and for fuel purposes the most important, part of biogas is methane. Pure methane is colourless and odourless. Spontaneous ignition of methane occurs when 4-15% of the gas mixes with air having an explosive pressure of between 90 and 104 psi. The explosive pressure shows that biogas is very combustible and must be treated with care like any other kind of gas. Knowledge of this fact is important when planning the design, building, or using of a digester.

### 3. Types of Digester

There are three main types of biogas plants suitable for integrated farms – the fixed dome plant, the floating drum plant and the plastic covered ditch.



**Fig. 3.1 Fixed – dome digester**



**Fig. 3.2 Floating drum [gas holder] digester**

The fixed – dome plants are more durable and cheaper than the floating drum plants.

The floating drum digester is more expensive and requires relatively less excavation. In farms located in regions where temperature is below 25<sup>o</sup>C, biogas plants can be heated to 370<sup>o</sup>c using passive or active methods.

#### **4. Conclusion**

Biogas is cheap source of energy and it is an alternate source of energy for creating awareness between rural peoples. This paper is very helpful for Researchers and Students at college levels and project. The various types of biogas plants are easy to understand and with help of this paper we can make a biogas plant. Biogas is easily generated by these plants.

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