Smt. S. R. Patel Engineering College Dabhi-unjha

Project:

EXPRIMENTAL INVESTIGATION ON PERFORMANCE IMPROVEMENT OF BIOGAS PLANT

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INTODUCTION

➢ ENERGY AND ENVIRONMENT: AN OVERVIEW

- Energy is the basis of human life. We need energy to do work. Over the past few decades, energy has been the subject of much debate. Energy is the backbone of technology and economic development.

- Energy is one of the major inputs for the economic development of any country.

- In the case of the developing countries, the energy sector assumes a critical importance in view of the ever-increasing energy needs requiring huge investments to meet them..

- Primary energy resources
  1. Coal
  2. Oil
  3. Gas

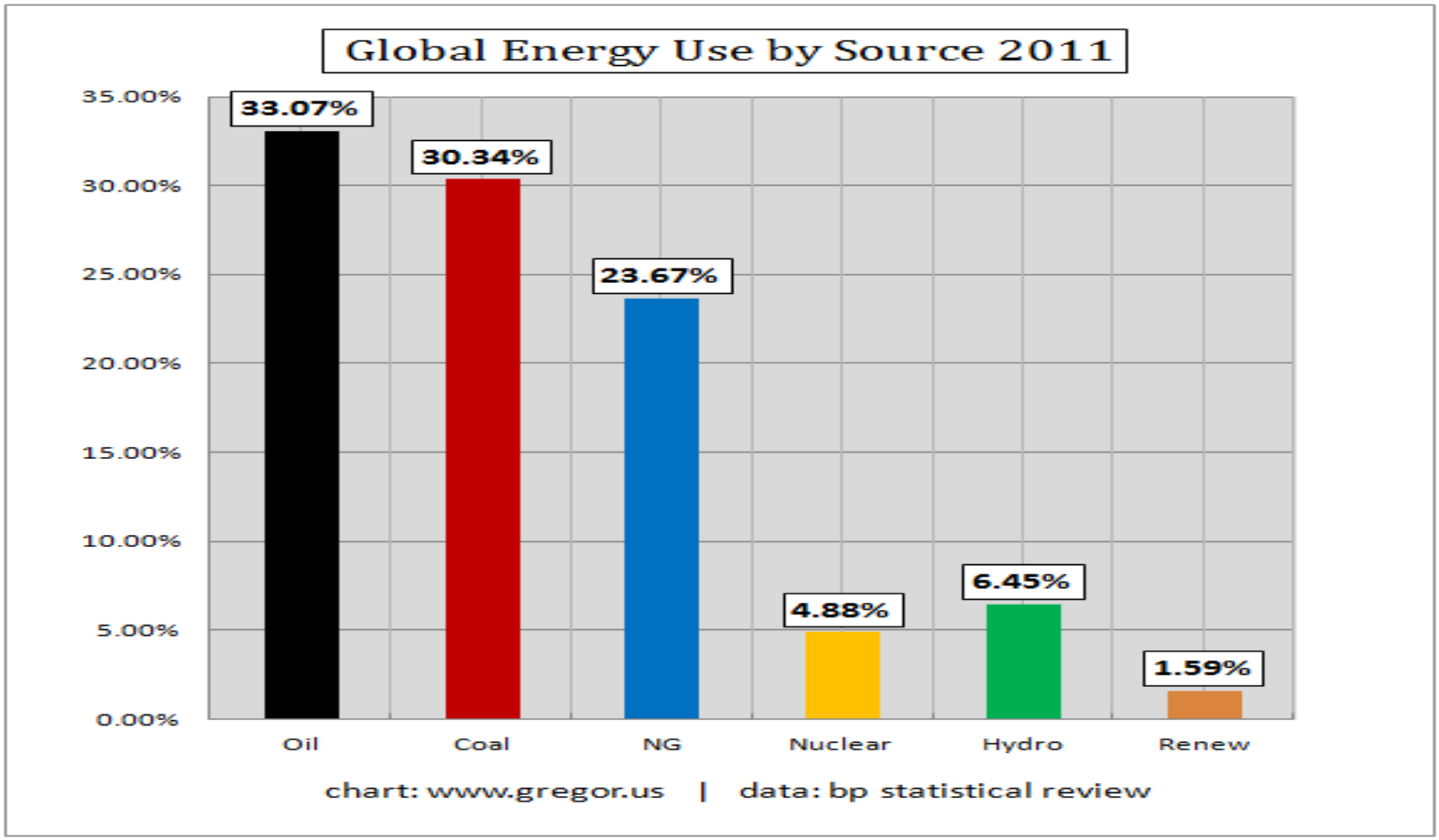


Fig.:1 Global Energy use by Source 2011

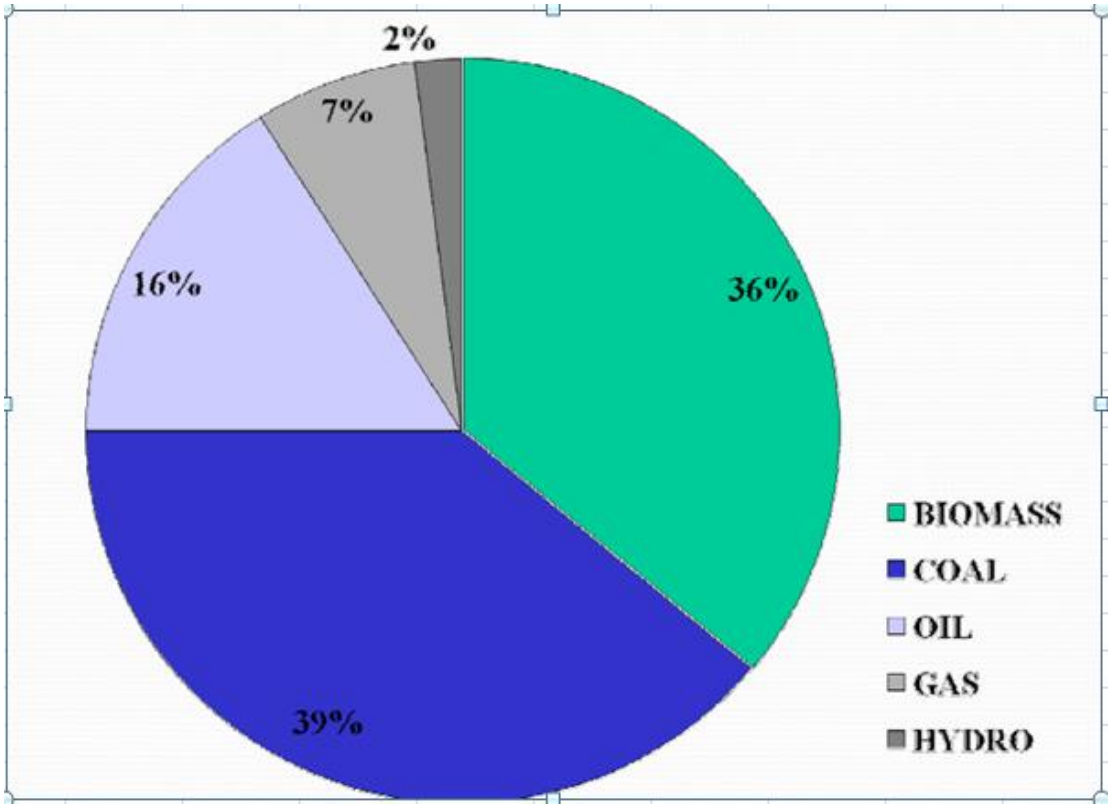


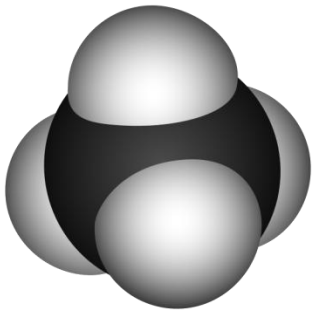
Fig 2 Energy use in India

- India has potential to generate 45,000 MW from wind energy, 19,000 MW from biomass energy, 15,000 MW from small hydro projects. In addition to it the urban areas in India produce @ 30 million of solid waste and 4400 Million cubic meters of liquid waste every year.

What is biogas?

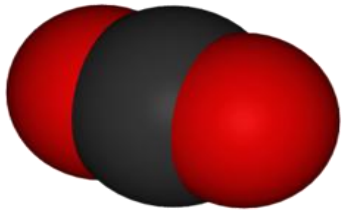
- Biogas originates from bacteria in the process of bio-degradation of organic material under anaerobic conditions and mainly consists of methane (60%).

CH_4



- A mixture of methane and carbon dioxide

CO_2



Find out more…

Biogas

Also known as…

……

……(A mixture of gases)

Used for lighting and……

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What is it made from?

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How is it made:……

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Benefits:……

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BIOGAS TECHNOLOGY

Composition of biogas

- show the Table typical composition of biogas.

Component	Concentration(by volume)
Methane (CH_4)	55-60 %
Carbon dioxide (CO_2)	35-40 %
Water (H_2O)	2-7 %
Hydrogen sulphide (H_2S)	20-20,000 ppm (2 %)
Ammonia (NH_3)	0-0.05 %
Nitrogen (N)	0-2 %
Oxygen (O_2)	0-2 %
Hydrogen (H)	0-1 %

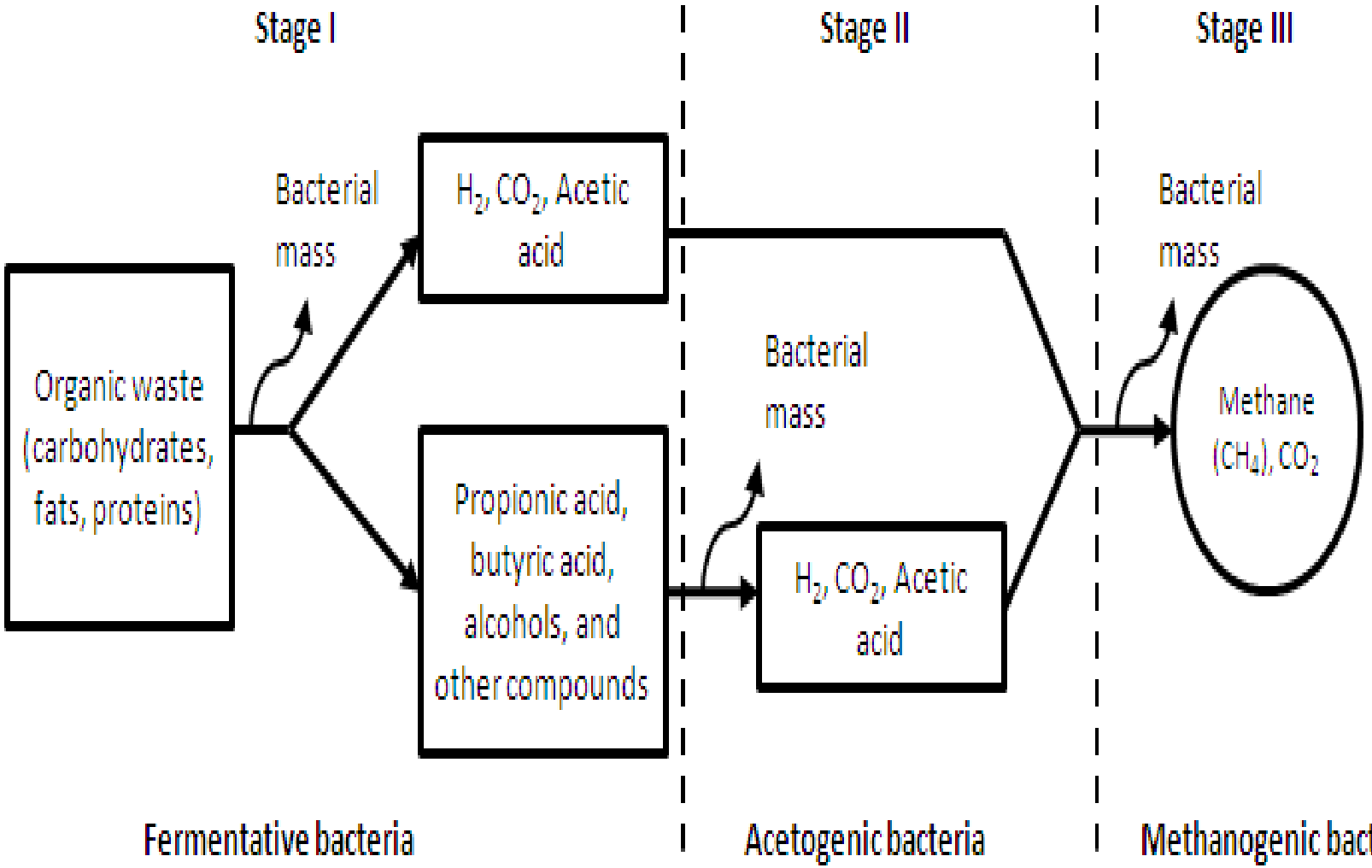
PRODUCTION PROCESS

A typical biogas system consists of the following components:

- Manure collection
- Anaerobic digester
- Effluent storage
- Gas handling
- Gas use.

❖ PROCESS AND MECHANISM OF BIOMETHANATION

main stages in anaerobic fermentation of organic material



Stage 1 – Hydrolysis
Bacteria decompose long chains of complex carbohydrates and proteins in the biomass into smaller molecules.

Stage 2 – Acidification
Acid-producing bacteria convert the smaller molecules produced in the first step into acetic acid (CH_3COOH), hydrogen (H_2) and carbon dioxide (CO_2).

Stage 3 – Methane formation (Anaerobic)
Methane-producing bacteria convert the acetic acid (CH_3COOH), hydrogen (H_2) and carbon dioxide (CO_2) into methane (CH_4) and carbon dioxide (CO_2). This mixture of gas is known as biogas.

❖OPERATIONAL PARAMETERS FOR BIOGAS PRODUCTION

1 Temperature
2 PH
3 Carbon: Nitrogen (C/N) ratio
4 Particle size
5 Water content
6 Agitation
7 Organic loading rate
8 Hydraulic retention time (HRT)
9 Seeding

❖ BIOGAS OPERATIONAL TECHNIQUES

- Batch wise process
- Continuous process

BIOGAS PLANT MODEL

❖ BIOGAS PLANT

- There are two types of processes for anaerobic fermentation: Continuous and batch.

- The continuous process is suitable for free-flowing suspended materials while the batch process is applicable to light materials.
  - The fixed- dome type of biogas plant
  - The floating gas holder type of biogas plant

❖Principle

Biogas is produced as a result of anaerobic decomposition of biomass in the presence of water.

❖FLOATING GAS HOLDER TYPE OF BIOGAS PLANT CONSTRUCTION

The floating gas holder type of biogas plant has the following chambers/ sections:

(1) Mixing Tank - present above the ground level.

(2) Digester tank - Deep underground well-like structure.

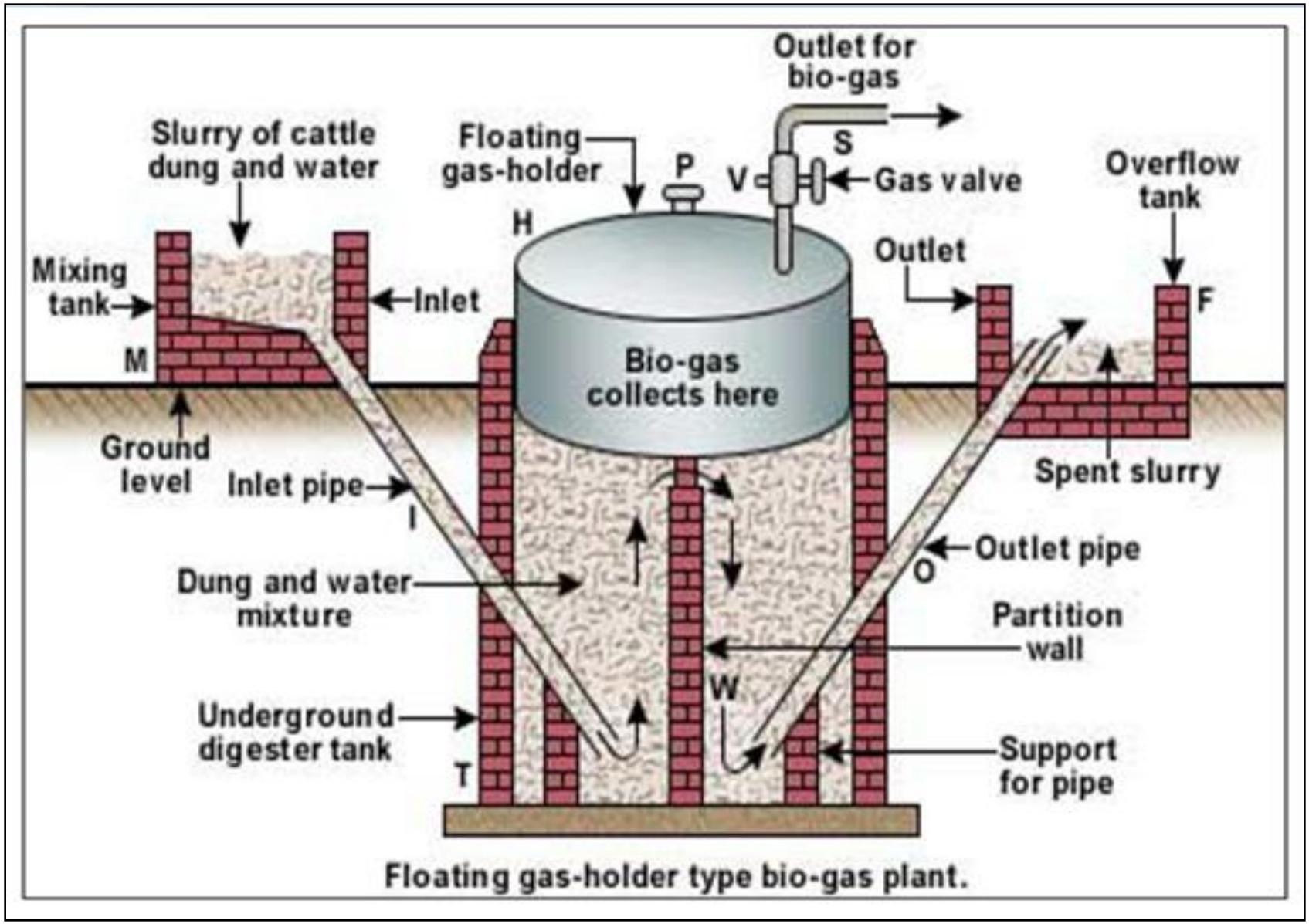
It is divided into two chamber by a partition wall in between.

It has two long cement pipes:

i) Inlet pipe

ii) Outlet

❖FLOATING GAS HOLDER TYPE OF BIOGAS PLANT



❖ Biogas plant model usefully material & configuration :

- plastic 500ltr tank (Biogas Digester)
- plastic 300ltr tank
- Spring spider Mechanism
- central guide pipe & PVC Holder
- Metal plate
- Gas cock, pipe
- Gas Outlet
- Inlet PVC Pipe
- Inlet slurry Chamber
- Molded Slurry Outlet
- 4-support for metal

Material use Biogas/cu.m

- Potato- 71%
- Cow dung - 60%
- Food west - 56%
- Poetry- 66%

per/cu.m Biogas plant produce gas different material can be use.

- Reading can be done to a location palanpur near laxmanpura.

SUPPORT PLATE (GALVANIZE MATERIAL)

- Lathe and drilling machine to be used for produce hole on the plate.

Final Setup photography:

PLANT GENERATE VIEW-1

PLANT GENERATE VIEW-2

PLANT GENERATE VIEW-3 (500LTR TANK IDIGESTOR)

PLANT GENERATE VIEW-3

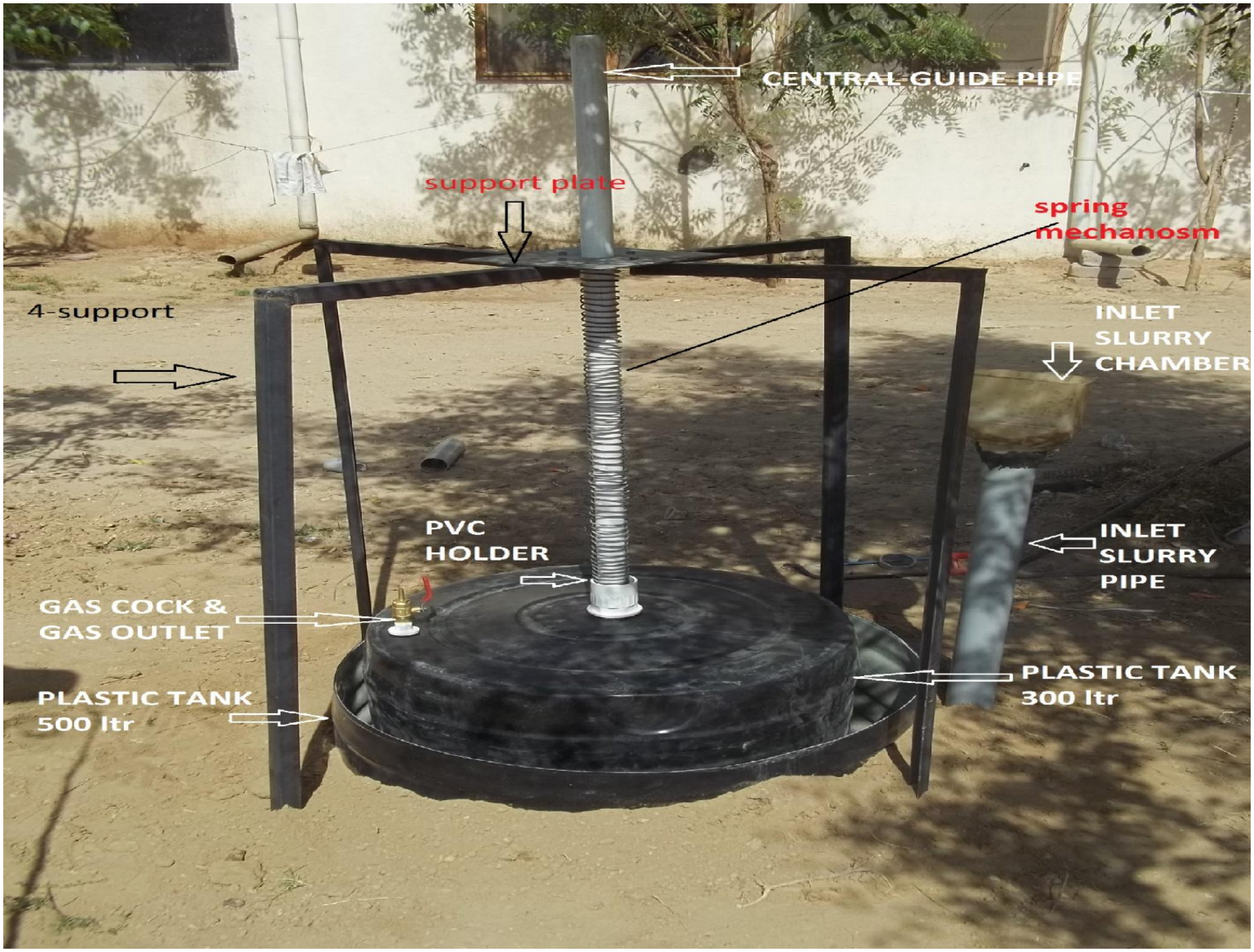
(SUPPORT OF CENTRAL GUIDE

PLANT GENERATE VIEW-4

PLANT GENERATES VIEW-5

(INSTAL & SUPPORT TO BE GUIDE)

FINAL PROJECT SETUP



- After working condition

➢Experiments carried out in check the pressure difference during digestion period.

AGAIN PROJECT CAN BE PRACTICALLY PERFORM SHAW PHOTO

Before Reading

After Reading practically

- perform.Cintex plant to be gas pressure is approximately near 280 kg/cm2

- Experiments carried out in 15 day and check the Pressure day to day & the pressure variation in each day is shown in **Table**

Per Days	Pressure (kg/cm2)
1-5	Digestion process
6	80
7	100
8	120
9	150
10	170
11	190
12	205
13	235
14	260
15	280

- SPRING MECHANISM TO BE USE.

Before spring normal condition

after spring working condition

- PRACTICALLY PERFORM TO BE MAKE GAS

This fig shows the application of biogas to produce a flame

➢Gas to be collected

Gas balloons and Gas compressor tube

Collection of biogas in gas balloons

➢ Gas to be collection of balloons from sintex biogas plant.

PH to be measure of PH meter:

❖SALIENT FEATURES AND PROJECT HIGHLIGHTS

- 1. Source for Main Raw Material: Firm source for the basic raw material, i.e. agriculture waste and cow dung will be obtained from the farmers in the cluster, which will be sufficient to produce 1000 cum biogas per day.

- 2. Other Raw Materials: All other raw materials are indigenous and are locally available. Hence there is no problem regarding raw materials.

- 3. Market Potential: The product has good market potential and there is adequate Demand/Supply gap to secure the selling of the product.

- 4. Nearness to Market and Raw Materials: Market as well as sources of raw materials is near to the plant, thereby selling overheads and excess inventory will be controlled.

- 5. Infrastructure Facilities: Project is being set up at a site that is well connected by road and there is adequate supply of power and water.

- 6. Effluent Treatment: No effluents will be generated, if so then, all effluents will be treated as per the norms.

- **7**. By-products: The by-product, bio-compost, as a result of the process used, is a very valuable for agricultural industry and will be sold locally.

- 8. Basis of Plant Design: The suppliers of the project are highly experienced in this line, and the manufacturing process of the said product is the latest. While arriving at the requirements of various types of equipment and machinery required for the plant, due consideration has been given to the following points:

- a. Minimum Wastage,
- b. Higher Productivity,
- c. Maximum Flexibility of Operations,
- d. Adequate standby provision, wherever necessary.

- 9. Labor

- 10. Quality Control

CONCLUSION & SUMMARY

- As know we have study all they operation parameter of Biogas plant in terms of their Quality and Quantity. The major operational parameters such as temperature, PH and methane contain less the major roll furtherer affective performance of Biogas plant.

So in the this semester we are in tinted to built a biogas plant and check they different operational parameters. That affect they perform. And improve digestion period, improve efficiency of biogas plant.

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Thank you....