



CLASS X
PHYSICS
CHAPTER 12 – SOURCES OF ENERGY

NOTES

SELECTION OF A FUEL

A good fuel should

- do a large amount of work on burning unit volume or unit mass of it.
- be easily accessible or abundantly available.
- be easy to transport and handle .
- be economical and eco-friendly.
- be easy to store.

Conventional sources of energy

Fossil fuels, hydel power plants and biomass are examples of conventional sources of energy. The main fossil fuels are i) coal ii) petroleum iii) natural gas They are non-renewable sources of energy and need to conserve.

Disadvantage of burning fossil fuels

- It causes pollution by adding acidic oxides of carbon ,hydrogen, nitrogen and sulphur into the air as byproducts. These oxides cause acid rain and affect our water and soil resources.
- The unburnt particles of carbon and hydrocarbon enter into the air making it harmful for breathing.
- It causes green-house effect by releasing excessive carbon dioxide

BIOMASS AND BIOGAS

Biomass: The waste material of living things (like cattle dung) and the dead parts of living things (like plants, trees and animals) is called biomass.

Biogas: The mixture of gases such as methane, carbon dioxide, hydrogen sulphide produced during the degradation of biomass by anaerobic organisms in the absence of air but with water is called biogas. It mainly contains 65 to 75 percent of methane.

➤ **Two types of biogas plant are-**

- Fixed dome type biogas plant
- Floating gas holder type biogas plant.

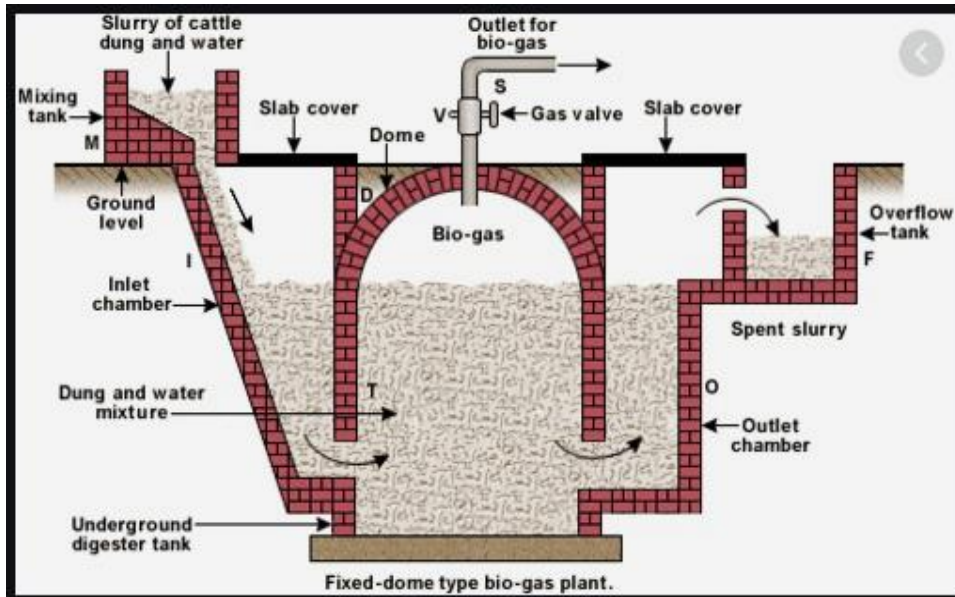


Figure : Fixed dome type biogas plant

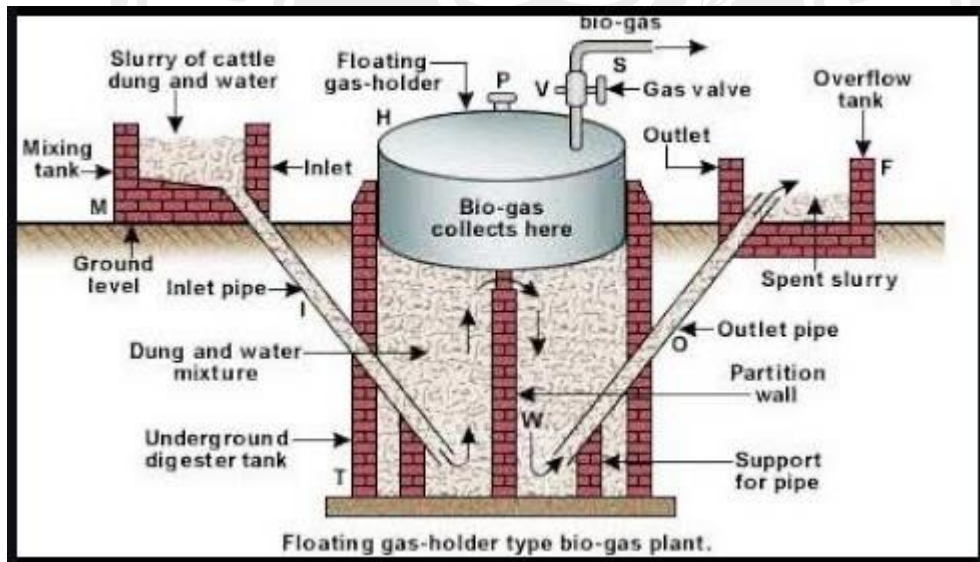


Figure: Floating gas holder type biogas plant.

Alternative/Non-conventional sources of energy

Solar energy, wind energy, tidal energy, geothermal energy, nuclear energy etc. are examples of non-conventional sources of energy. They are non-renewable sources of energy. These sources are eco-friendly.



Solar energy

Solar constant:

The total solar energy of all wavelengths received per unit time by a surface of unit area oriented normally to the sun's rays at the top of the earth's atmosphere is called solar constant.

- Solar energy is measured by solar constant
- Solar constant is $1.39 \text{ kJ/m}^2/\text{s}$
- Solar heat is used in solar cooker and solar heater.

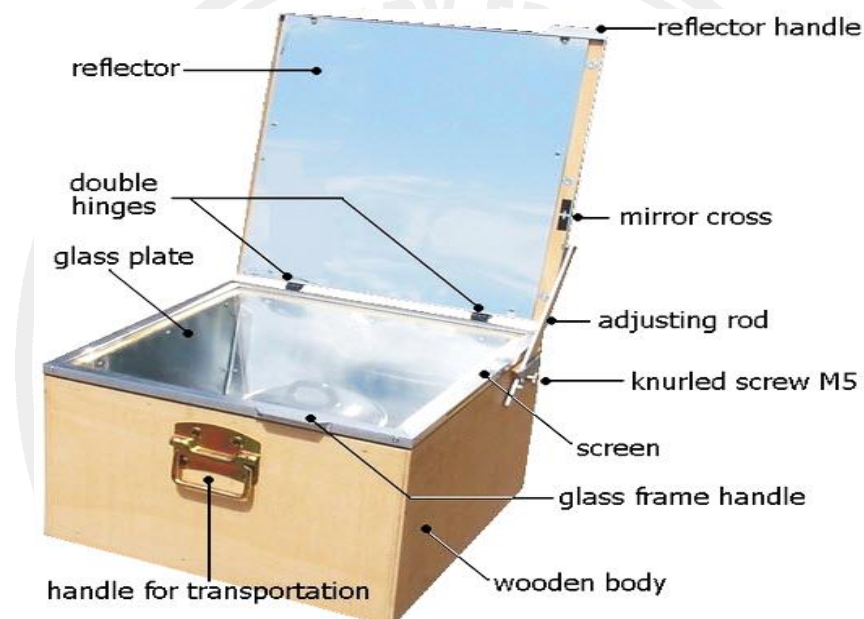


Figure: Solar cooker

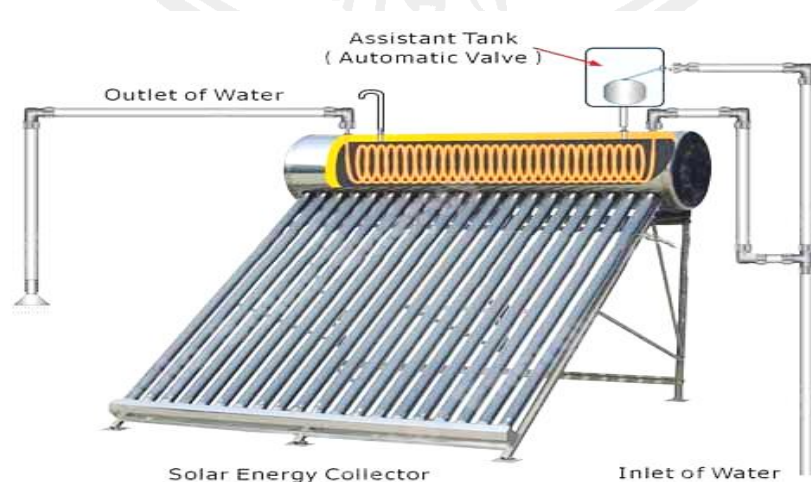


Figure: Solar water heater



Uses of Solar energy

- Solar energy can be used to generate electricity with the help of photo voltaic devices
- Photo voltaic devices- solar cells or solar batteries, solar panel



Figure: solar panel

Wind energy

- Kinetic energy of wind can be used to provide rotatory motion of the wind turbine to perform some work or generate electricity
- The power available from the wind depends on-
 - a. The area of the blade circle
 - b. Density of the air
 - c. Cube of the wind velocity
- Merits of wind energy-
 - a. It is an environment friendly method
 - b. No recurring expenses for energy production required
- Limitations in harnessing wind energy-
 - a. Wind energy farms can be established only at selected places
 - b. It requires large area of land
 - c. There should be enough back up facilities like storage cells.
 - d. Initial cost of establishment of farm is very high
 - e. High cost maintenance

Energy from the sea- tidal energy

The surface of sea water is heated by the sun while water in the deeper section is relatively cold. The heat in the surface water is used to boil a volatile liquid like ammonia. The vapour produced is used to run the turbine of generator. Cold water from the depth is used to condense the vapour again to liquid.



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Geothermal energy

- When underground water comes in contact with the hot spot, steam is generated
- When the steam is rooted through a pipe to a turbine of a generator, electricity can be produced.

Nuclear energy

- Energy released during nuclear reaction is called nuclear energy
- There are two types of nuclear reaction
 - 1) Nuclear fission
 - 2) Nuclear fusion

Nuclear fission: In nuclear fission, the nucleus of a heavy atom (such as Uranium, plutonium or thorium) is splitted into two lighter nuclei with the help of slow moving neutron. In this process a huge amount of energy is released.

Nuclear fusion: In nuclear fusion, two energetic light nuclei fuse together to make a heavy nucleus with the release of huge amount of energy.



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