**Dr. Rima Kumari: Date: 02/09/2020**

Online class and e- content for B.Sc. IInd Year Botany

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| Date and Time | Online class medium | E. content topic |
| 02/09/2020  02:30 p.m to 3.20 p.m | Via Google meet  Link: Meeting URL: https://meet.google.com/rhk-ectx-wmk | **Biogas** |

**B.Sc. Hons. PAPER IV Unit IV**

**Biogas**

**Biogas:**

Biogas is a type of biofuel that is naturally produced from the decomposition of organic waste. Forestry, crops, sewage, industrial residue, animal waste, and municipal waste are all used to create the biogas renewable energy. Traditionally biogas was used for cooking and heating purposes but these days it is being used for a number of other things as well. By the year 2050 it is thought that biogas will account for around one third of all energy. Biogas is already being used in rural areas as well as in urban areas. Based on the industry needs, the creation of biogas is creating many job opportunities. The most common way that biogas is created is by anaerobic combustion (burning in absence of oxygen). Biochemical processes also have the power to produce clean energy.

When organic matter, such as food and animal waste, break down in an anaerobic environment (an environment absent of oxygen) they release a blend of gases, primarily methane and carbon dioxide.  Because this decomposition happens in an anaerobic environment, the process of producing biogas is also known as anaerobic digestion. So on, biogas is a renewable energy source produced by the breakdown of organic matter by certain bacteria under anaerobic conditions. It is a mixture of methane, hydrogen, and carbon dioxide. It can be produced by agricultural waste, food waste, animal dung, manure, and sewage. The process of biogas production is also known as anaerobic digestion. In Anaerobic digestion waste-to-energy transformation occurs, via using the process of fermentation to breakdown organic matter. Animal manure, food scraps, wastewater, and sewage are all examples of organic matter that can produce biogas by anaerobic digestion. Due to the high content of methane in biogas (typically 50-75%) biogas is flammable, and therefore produces a deep blue flame, and can be used as an energy source.

Biogas produced during combustion of the waste products under anaerobic condition naturally for purpose of recycling of waste products and converts them into useful energy, thereby preventing any pollution caused by the waste in the landfills, and down the effect of the toxic chemicals released from the sewage treatment plants.

Biogas converts the harmful methane gas produced during decomposition, into less harmful carbon dioxide gas. The organic material decomposes only in a wet environment. The organic matter or the waste dissolves in water and forms a sludge which is rich in nutrients and used as a fertilizer.

**Biogas Plant**

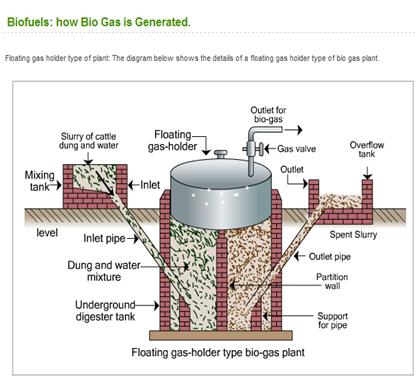
To prevent off methane gas release to the atmosphere, biogas digesters are the systems that process waste into biogas, and then channel that biogas so that the energy can be productively used. The biogas production is carried out in anaerobic digesters known as Biogas plant. There are several types of biogas plants that have been designed to make efficient use of biogas. While each model differs depending on input, output, size, and type, the biological process that converts organic waste into biogas is uniform. Biogas digesters receive organic matter, which decompose in a digestion chamber. The digestion chamber is fully submerged in water, making it an anaerobic (oxygen-free) environment. The anaerobic environment allows for microorganisms to break down the organic material, and convert it into biogas.

These have five components:

* An inlet to feed the slurry
* The fermentation chamber where the biogas is produced with the activity of microorganisms,
* The gas storage tank to store the gas produced,
* The outlet for the used slurry,
* The exit pipe for removing the gas produced.

The organic matter if fed into the digesters which are completely submerged in water to provide it with an anaerobic environment. These digesters are hence called anaerobic digesters. The microorganisms breakdown the organic matter and convert it into biogas.

The biogas thus produced is supplied to the respective places through the exit pipes.



Process of Biogas Formation

1. The first stage involves the breakdown of organic polymers, such as carbohydrates, making it available to the next stage of bacteria known as the acidogenic bacteria.
2. The acidogenic bacteria then convert the sugar and amino acids into carbon dioxide, ammonia, hydrogen, and organic acids.
3. The organic acids are now converted into acetic acid, hydrogen, ammonia, and carbon dioxide.
4. These are finally converted into methane and carbon dioxide by the action of methanogens.

Methane is a combustible gas, i.e., it can be burnt. This gas is supplied to various places and is used in cooking and lighting. It is an eco-friendly gas and reduces various environmental problems like, it reduces the reliance on fossil fuels, and the harm caused by methane, a [greenhouse gas](https://byjus.com/biology/greenhouse-effect-gases/) released by the waste globally since the methane gas is reduced to a non-dangerous form: carbon dioxide.

**Importance of Biogas**

BIOGAS – THE RENEWABLE ENERGY SOURCE

Any renewable energy source is regarded as exceptionally important in our modern society. With a changing climate that is resulting in intense droughts, devastating hurricanes and diminishing ozone, investing in a clean, renewable energy source is definitely the way of the future. Biogas is fast becoming a valuable energy source which is contributing to the electric capacity which is being generated throughout the world. Biogas is also the ideal way to ensure that all areas have access to electricity. As a fairly cheap source of electricity, biogas is a fuel source that has the power to provide decent energy to the world.

1. Biogas: as Fuel

Deforestation is the result of trees being cut down and used as fuel for fires in areas where there is no access to electricity. With biogas, the waste that would be there anyway can be used to create fuel. This means that trees do not have to be cut down and plants do not have to be damaged.

1. Biogas is cheap to produce

Each year the price of electricity goes up, and with there not being enough electricity to keep the country powered, more power stations need to be built in order provide everyone with electricity. The electricity that we use these days comes with a hefty price but biogas can also provide stable electricity, and the power created will be cheaper. Biofuel can be used in vehicles to get people moving. Another factor that affects the price of biogas, is the fact that it can be produced in small amounts or large amounts.

1. Biogas is a source of income

For those nations that struggle to provide employment for all of its people, the production of biogas can be the answer. Biogas plants are creating employment opportunities for people across all types of communities. In rural areas people can benefit in many ways as biogas will not only create job opportunities but it is also able to produce cheap electricity for homes and businesses that have previously been without it. With biogas being cheap to produce and cheap to set up, a business creating biogas can be a profitable one.

1. Biogas is renewable

As a renewable source of energy, biogas can be constantly produced without the worry of the source of the fuel running out. At the moment, the vast amount of energy sources on the planet consists of non-renewable resources such as coal. As the fuel is produced from natural waste products, the source of the fuel is never going to run out. In a world that is suffering from the damage caused by the burning of fossil fuels, biogas is a most welcome renewable alternative.

Biogas is the fuel of the future and has the power to heal the earth, while creating jobs for those in need. Biogas is definitely one of the best alternative fuel sources.