

Objective

- This product is used in the production of soaps:
 glycerol ethanol acrylic acid Formic acid
- To preserve fruits vegetables and pickles we add:
 Onion and garlic Flour and Salt
 Salt and acid Water and yogurt
- The animal whose DNA has been changed is:
 dihybrid monohybrid transformed transgenic
- The human genome project was started in:
 1991 A.D 1990 A.D 1992 A.D 1993 A.D
- When was the work on Genetic Engineering started:
 1940 1970 1944 1930
- The design and arrangements for continuous fermentation are:
 complex un-complicated impossible simple
- The enzyme works as breaking enzyme:
 Lipase Endonuclease Amylase Ligase
- In Scotland in 1977 what an embryologist Ian Wilmut produced from the body cell of an adult sheep:
 Buffalo Cow Goat Sheep Dolly
- In the first step of glycolysis one molecule of glucose is broken down into two molecules of:
 Formic acid Citric acid pyruvic acid lactic acid
- The microorganism used in the production of Formic Acid is:
 Bacillus Aspergillus Bacteria Yeast
- Incomplete oxidation-reduction of occurs in fermentation.
 lipids fats proteins glucose
- When did Ian Wilmut produced the sheep Dolly?
 2002 AD 1997 AD 1970 AD 1987 AD
- The main source of all types of Fermentation:
 Micro-organism Alleles Genes Chromosomes
- In cattle, goats and deer, the foot and mouth disease is:
 Viral Fungal Bacteria All of these
- Painkiller chemical produced by brain is:
 Thymosin Interferon insulin Betaendorphin
- Fungi used in alcoholic fermentation is called:
 zygomycetes algin
 saccharomyces cerevisiae basidiomycetes
- In the process of Glycolysis, glucose molecule is broken down into two molecules of:

- (A) Pyruvic acid (B) Ethanol (C) Ethanol and CO₂ (D) Lactic acid
18. Acrylic acid is used in the production of:
 (A) Plastics (B) Beverages (C) Cosmetics (D) Vinegar
19. Name of the yeast, used in fermentation is:
 (A) Lactobacillus (B) Aspergillus (C) Streptococcus (D) Saccharomyces
20. The process in which there is incomplete-oxidation-reduction of glucose is called:
 (A) DNA technology (B) genetic engineering (C) biotechnology (D) fermentation
21. This product is used in the production of vinegar and beverages:
 (A) glycerol (B) ethanol (C) acrylic acid (D) Formic acid
22. Which organism is used in fermentation for the preparation of glycerol?
 (A) Saccharomyces (B) Bacillus (C) Streptococcus (D) Aspergillus
23. Which one is fermented food:
 (A) Powdered milk (B) Vitamins (C) Yogurt (D) Wheat flour
24. This acid is used in electroplating:
 (A) Glycerol (B) Ethanol (C) Acrylic acid (D) Formic acid
25. The microorganism used in the formation of Ethanol is:
 (A) E-Coli (B) Bacillus (C) Virus (D) Sacchromyces
26. The product used in printing is:
 (A) acrylic acid (B) ethanol (C) glycerol (D) formic acid
27. Vector DNA and Gene of interest, collectively called:
 (A) Gene (B) Recombinant Gene
 (C) Recombinant DNA (D) GMO
28. Human insulin was firstly prepared through bacteria:
 (A) 1995 (B) 1978 (C) 1990 (D) 1970
29. The complete map of human genome was published in:
 (A) 2002 (B) 2008 (C) 2006 (D) 2004
30. In Genetic Engineering, plasmid is used as:
 (A) Donor (B) Ligases (C) Vector (D) Endonucleases
31. The enzyme used to dissolve blood clots is called:
 (A) trypsin (B) pepsin (C) amylase (D) urokinase
32. The hormone which many prove effective against brain and lung cancer which is produced by genetically modified organism:
 (A) thymosin (B) ligase (C) urokinase (D) insulin
33. Patients of which disease use insulin:
 (A) diabeties (B) aids (C) cancer (D) hepatitis
34. Bacterium (E-Coli) which prepares human growth hormone was discovered in:
 (A) 1910 (B) 1977 (C) 1970 (D) 1980
35. Human insulin gene was transferred into:
 (A) Bacteria (B) Algae (C) Virus (D) Yeast

36. Interferons are Proteins.
 (A) Antifungal (B) Antiviral (C) Antidrugs (D) Antibacterial
37. A hormone produced by genetically modified organisms used to cure cancer of brain and lungs is:
 (A) insulin tnymosin (B) Tyroxin (C) Anti-diuretic hormone (D) Thymosin
38. The host country of the greatest no of refugees in the world is:
 (A) Pakistan (B) America (C) Canada (D) India
39. When does it become possible to cut DNA?
 (A) 1990 A.D (B) 1890 A.D (C) 1980 A.D (D) 1970 A.D
40. Single cell protein can be obtained from:
 (A) Bird (B) Algae (C) Cow (D) Insect
41. The raw material for microorganism for the production of single cell protein is:
 (A) protozoans (B) fungi (C) Agricultural wastes (D) Industrial wastes
42. The Enzyme used for joining Gene is:
 (A) Amylase (B) Ligase (C) Endonuclease (D) Lipase
43. Algae grown in ponds produce protein per acre/year:
 (A) 40 tons (B) 30 tons (C) 10 tons (D) 20 tons
44. Lactic acid fermentation is carried out by many:
 (A) Protozoans (B) Bacteria (C) Algae (D) Fungi
45. The industrial product from aspergillums is:
 (A) acrylic acid (B) glycerol (C) ethanol (D) formic acid
46. Organisms with modified genetic set up are called:
 (A) rearranged (B) transgenic (C) hybrid (D) transformed
47. The enzyme which is used to cut the gene of interest is:
 (A) Amylase (B) Lipase (C) Ligase (D) Endonuclease
48. Glucose molecule is broken into Pyruvic acid:
 (A) 1 (B) 2 (C) 4 (D) 5
49. Find the correct match for the fermentation product and the organism involved:
 (A) Formic acid - Saccharomyces (B) Glycerol - Aspergillums
 (C) Ethanol - Saccharomyces (D) Ethanol - Aspergillums
50. Which of these is an anti-viral protein?
 (A) Insulin (B) Interferon (C) Thymosin (D) Urokinase
51. Animal Breeding is a form of:
 (A) Morphology (B) Biotechnology (C) Cell Biology (D) Pharmacology
52. Who introduced the method of single cell protein?
 (A) Joseph Lister (B) Ian Wilmut (C) Scrimshaw (D) Pasteur
53. product is used in the production of plastics.
 (A) formic acid (B) acrylic acid (C) glycerol (D) ehanol

54. Treatment through genes is called:

- (A) Genetherapy (B) Radiotherapy (C) Physiotherapy (D) Chemotherapy

55. Alcoholic Fermentation is carried out by:

- (A) Fungi (B) Yeast (C) Aspergillus (D) Virus

56. Dolly is the names of a:

- (A) Sheep (B) Mouse (C) Flower (D) Rabbit

57. Yogurt is made from milk fermentation by:

- (A) Bacillus (B) Lactic acid bacteria (C) Yeast (D) Saccharomyces

58. Sewage water is purified by the use of:

- (A) Minerals (B) Microbes (C) Hormones (D) Bacterial Enzymes

59. Ethanol is used in the production of:

- (A) Vinegar (B) Rubber (C) Soap (D) Plastic

60. Very effective hormone for brain and lungs cancer is:

- (A) Urokinase (B) Interferon (C) Beta-endorphin (D) Thymosin

61. Acrylic acid is used in the production of:

- (A) Plastic (B) Soap (C) Printing (D) Vinegar

62. Interferons were first time produced in:

- (A) 1976 (B) 1980 (C) 1978 (D) 1974

Chapter : 17

Biotechnology



Subjective

Q1: **Define Biotechnology.**

Ans: **Biotechnology:**

It is define as use of living organism for the manufacturing of useful products or for services.

Q2: **What is gene therapy?**

Ans: **Gene therapy is:**

Gene therapy is the treatment through genes. Gene therapy has become important in recent years.

Q3: **Write down the names of major techniques in biotechnology.**

Ans: *The names of major techniques in biotechnology are:*

Cross pollination of plants and cross breeding of animals were major techniques in biotechnology.

Q4: **Describe human genome project.**

Ans: *In 1990 Human genome project" was launched to map all the genes in human cells. The complete map was published in 2002.*

Q5: **Who produced dolly and when?**

Ans: *In Scotland, in 1997, an embryologist Lan Wilmut produced a sheep dolly from the body cell of an adult sheep.*

Q6: **Write any two characteristics of transgenic animals.**



In Scotland, in 1997, an embryologist lan Wilmut produced a sheep (Dolly) from the body cell of an adult sheep.

Ans: These are the following characteristics of transgenic animals:

- ❖ Transgenic animals produce more yields.
- ❖ Resistance against diseases.
- ❖ Insects.
- ❖ Herbicides.

Q7: **Give example, how biotechnology is helping in the field of medicine.**

Ans: In the field of medicine, biotechnologists synthesized insulin and interferon from bacteria and released for sale. A large number of vaccines and antibodies, human growth hormone and other medicines have also been produced; various enzymes are being synthesized for medicinal as well as industrial use.

Q8: **Describe scope and importance of biotechnology.**

Ans: The following are some areas of the applications of biotechnology:

- ❖ Biotechnology and environment.
- ❖ Biotechnology in the field of food and agriculture.
- ❖ Biotechnology in the field of medicine.

Q9: **Why are Transgenic organisms being developed?**

Ans: Transgenic (organisms with modified genetic set up) plants are being developed, in which desirable characteristics are present.

Example:

More yields and resistant against diseases, insects and herbicides.

Transgenic goats, chickens, cows give more food and milk etc.

Many animals like mice, goats, cows etc. have been made transgenic to get medicine, through their milk, blood or urine.

Q10: **Write one advantage of lactic acid fermentation.**

Ans: Advantage of lactic acid fermentation is:

- ❖ It is quite important in dairy industry where it is used for souring milk.
- ❖ Also for production of various types of cheese.

Q11: **Describe the services of Pasteur for fermentation.**

Ans: The services of Pasteur for fermentation:

In 1857 Pasteur convinced the scientific community that all fermentations are the result of microbial activity.

Q12: **Differentiate between Alcoholic Fermentation and Lactic Acid Fermentation. Or How lactic acid fermentation takes place?**

Ans: Difference between Alcoholic Fermentation and Lactic Acid Fermentation is:

| Alcoholic Fermentation | Lactic Acid Fermentation |
|--|--|
| <ul style="list-style-type: none"> ❖ The fermentation is carried out by many types of yeast. ❖ <u>Example:</u> <i>Saccharomyces cerevisiae</i>. | <ul style="list-style-type: none"> ❖ In this process, pyruvic acid is reduced to lactic acid. It is carried out by many bacteria. ❖ <u>Example:</u> <i>Streptococcus</i> and many <i>Lactobacillus</i> species. |

Q13: **Describe the uses of fermentation in dairy products.**

Ans: The uses of fermentation in dairy products are:

Cheese and yogurt are important fermentation products. Cheese is formed when a milk protein is coagulated. This happens when the acid produced by lactic acid bacteria reacts with milk protein. Yogurt is made from milk by different lactic acid bacteria.

Q14: **What is meant by fermentation?**

Ans: **Fermentation:**

It is a process in which there is incomplete oxidation, reduction of glucose. It was believed that it is purely a chemical process.

Q15: **Write the name of any two basic types of fermentation.**

Ans: The name of two basic types of fermentation is:

This diagram is just for understanding.

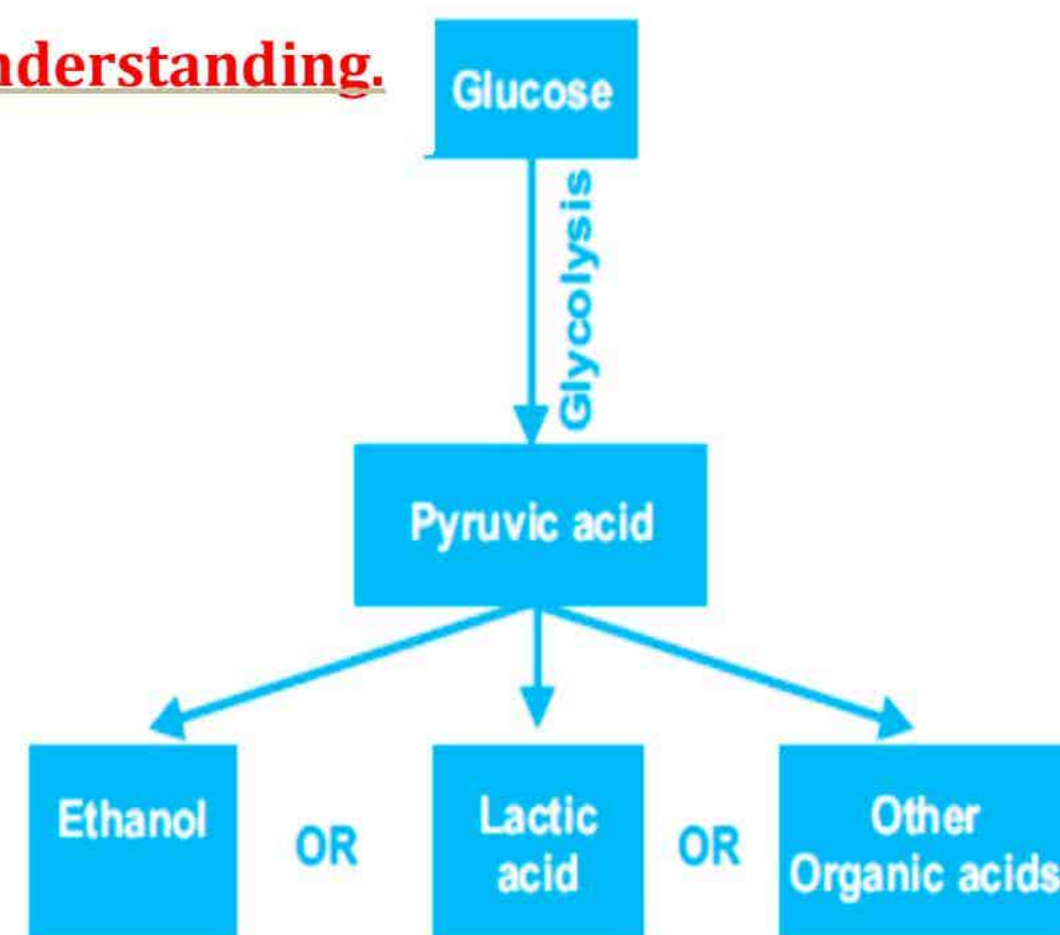


Figure Carbohydrate fermentation and its products

- ❖ Alcoholic Fermentation.
- ❖ Lactic Acid Fermentation.

Q16: Define glycolysis and name its product.

Ans: Glycolysis:

Glycolysis is the process in which glucose molecule is broken down into two molecules of pyruvic acids.

Product's name:

- ❖ Pyruvic acid.

Q17: Write any two applications of fermentation.

Ans: The applications of fermentation are:

Fermented Foods:

Fermentation often makes the food more nutritious, more digestible and tastier. It also tends to preserve the food, lowering the need for refrigeration.

Cereal products:

Bread is the commonest type of fermented cereal product. Wheat dough is fermented by *S. cerevisiae* along with some lactic Acid bacteria.

Q18: Write two products of fermentation of carbohydrates.

Ans: The initial steps of carbohydrates fermentations are identical to those of respiration. The process begins with glycolysis, in which the glucose, molecule is broken into two molecules of pyruvic acid.

Different microorganisms precede the further reactions in different ways. It results in the formation of various products from pyruvic acid.

- ❖ Alcohol
- ❖ Lactic Acid

Q19: Write few uses of ethanol in individual products.

Ans: Ethanol used as a solvent used in the production of vinegar and beverages.

Q20: Write four industrial products prepared by fermentation.

Ans: Following industrial products are obtained from fermentation:

- ❖ Ethanol.
- ❖ Acrylic acids.
- ❖ Glycerol.
- ❖ Formic acid.

Q21: Write two uses of glycerol.

Ans: Glycerol is used in following terms:

- ❖ It is use in the production of plastics.
- ❖ Glycerol is used in cosmetics.
- ❖ Glycerol is used in soap.

Using in printing:

- ❖ It is use as sweetener.

Q22: Write four uses of formic acid.

Ans: Formic acid is used in:

- ❖ Rubber manufacturing.
- ❖ Leather treatment.
- ❖ Used in textile dying.
- ❖ Electroplating.

Q23: Write the name and uses of any two industrial products produced through fermentation.

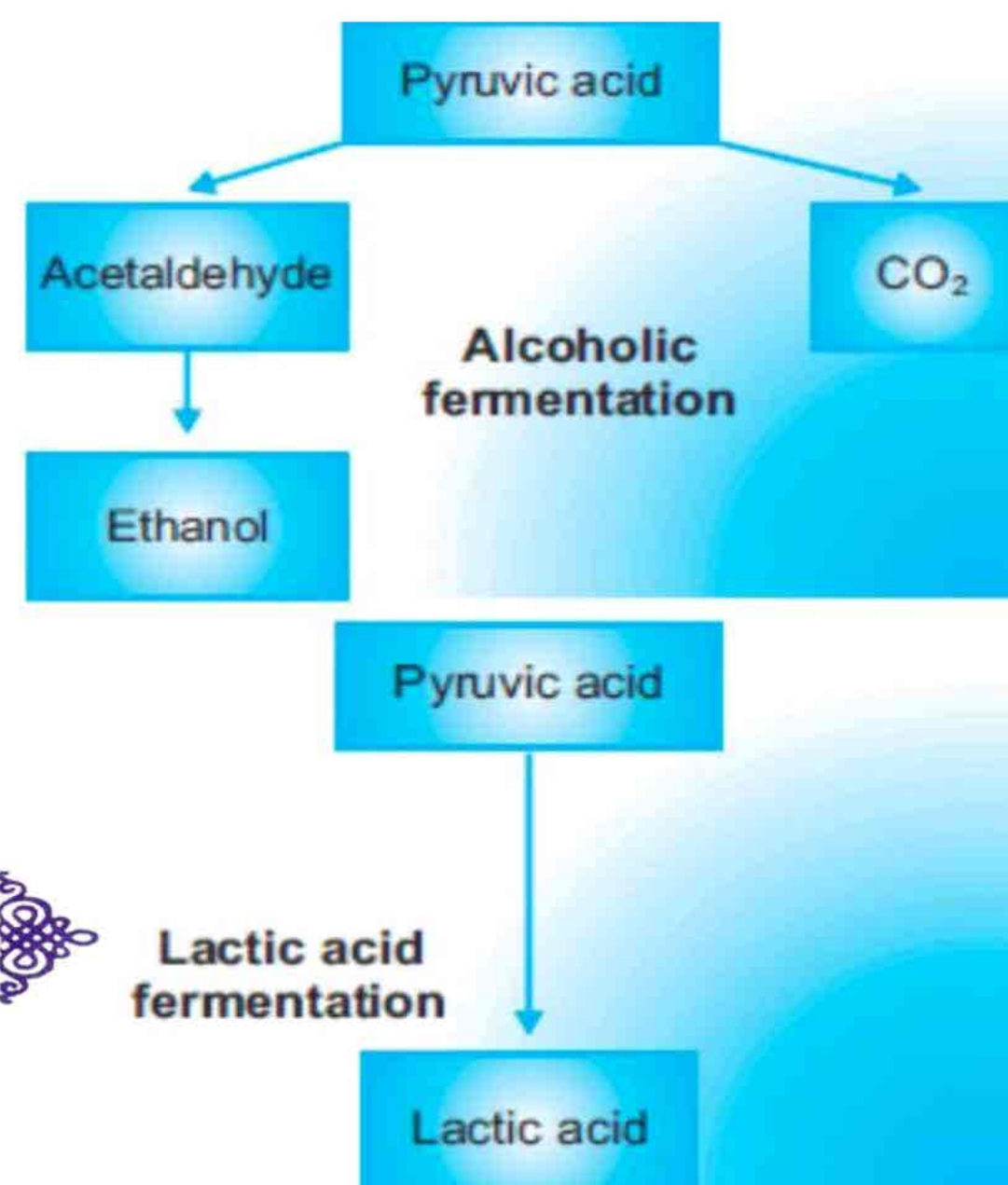
Ans: Name and uses of industrial products produced through fermentation:

Acrylic Acid:

Acrylic Acid used in the production of Plastics.

Formic Acid:

This diagram is just for understanding.



Formic Acid used in textile dyeing, leather treatment. Electroplating, rubber manufacture.

Q24: Write down the application of fermentation in beverage products.

Ans: The application of fermentation in beverage products:

Beer is produced from cereal grains which have been malted, dried and ground into fine powder. Fermentation of the powder is done by yeast.

This process breaks the glucose present in powder into pyruvic acid and then into ethanol. Grapes can be directly fermented by yeasts to wine.

Q25: Define fermentation with reference of biotechnology.

Ans: In biotechnology the term fermentation means the production of any product by the mass culture of microorganisms.

Q26: Write down advantages of fermented food.

Ans: The advantages of fermented food are:

- ❖ Fermentation often makes the food more nutritious, more digestible and tastier.
- ❖ It also tends to preserve the food, lowering the need for refrigeration.

Q27: What is malted food?

Ans: Malted food:

Bear is produced from cereal, grains, which have been malted, dried and ground into fine powder. Fermentation of the powder is done by yeast. This process breaks the glucose present in powder into pyruvic and then into ethanol.

Q28: State the Role of biotechnology in the field of Food and Agriculture.

Ans: Fermented foods (e.g. Pickles Yogurt) malted food (e.g. Powdered milk: a mixture of Barely, wheat flour and whole milk), various vitamins are used in dairy products are produced by using microorganisms, Wine and bear are produced in beverage industry.

Transgenic (organisms with modified genetic set up) plants are being developed, in which desirable characteristics are present.

Example:

More yields and resistant against diseases, insects and herbicides.

Transgenic goats, chickens, cows give more food and milk etc.

Many animals like mice, goats, cows etc. have been made transgenic to get medicine, through their milk, blood or urine.

Q29: How cheese is formed?

Ans: Cheese and yogurt are important fermentation products. Cheese is formed when a milk protein is coagulated. This happens when the acid produced by lactic acid bacteria reacts with milk protein. Yogurt is made from milk by different lactic acid bacteria.

This diagram is just for understanding.



Figure : Fermented foods

Q30: For which propose microbes are used?

Ans: Microbes are being developed to be used as bio-pesticides, bio-fertilizers, biosensors etc. such transgenic microorganisms are also used for the recovery of metals, cleaning of spilled oils and for much other purpose.

Q31: What is meant by genetically modified organism in biotechnology?

Ans: Recombinant DNA is transferred to the target host. In this way, host organism is transformed into a genetically modified organism. GMO are provided suitable culture medium for growth to give as much copies of the gene of interest as needed.

Q32: **Differentiate between batch fermentation and Continuous fermentation.**

Ans: Difference between batch fermentation and Continuous fermentation is:

| Batch fermentation | Continuous fermentation |
|---|---|
| In this process, the tank of fermenter is filled with the raw materials to be fermented. The temperature and PH for microbial fermentation is properly adjusted, and nutritive supplements are added. All the materials are steam sterilized. The pure culture of microorganisms is added to fermenter from a separate vessel. Fermentation proceeds and after the proper time the contents of fermenter are taken out. Fermenter is clean and the process is repeated. | In this process, the substrate is added to fermenter continuously at a fixed rate. This maintains the microorganisms in growth phase. Fermentation products are taken out continuously. |

Q33: **What is fermenter?**

Ans: **Fermenter:**

Fermenter is a device that provides optimum environment to microorganisms to grow into a biomass, so that they can interact with a substrate, forming the product. Fermentation is carried out in fermenters in the following two ways.

- ❖ Continuous fermentation.
- ❖ Batch fermentation.

Q34: **What are the advantages of fermenter?**

Ans: The advantages of fermenter are:

- ❖ For each biotechnological process, the environment provided to the organisms must be monitored and controlled.
- ❖ Such a control environment is provided by fermenters.
- ❖ A fermenter optimizes the growth of the organisms by controlling many factors like nutrients, oxygen and temperature.



Figure: Fermenters used in food and pharmaceutical industry

Q35: **Write types of fermenters?**

Ans: Types of fermenters:

- ❖ Continuous fermentation.
- ❖ Batch fermentation.

Q36: **What do you know about continuous fermentation process?**

Ans: **Continuous fermentation:**

In this process, the substrate is added to fermenter continuously at a fixed rate. This maintains the microorganisms in growth phase. Fermentation products are taken out continuously.

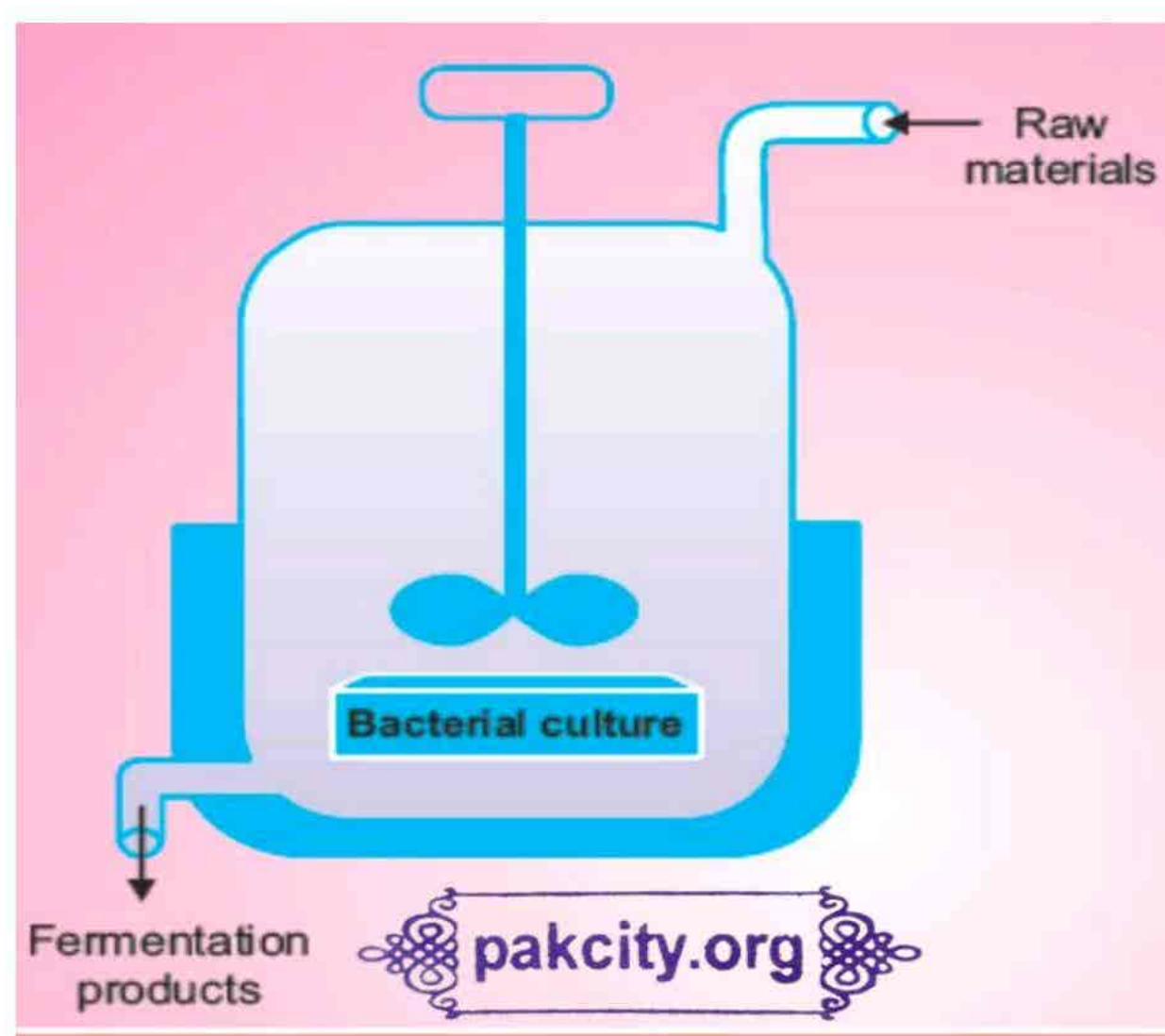


Fig A continuous fermenter

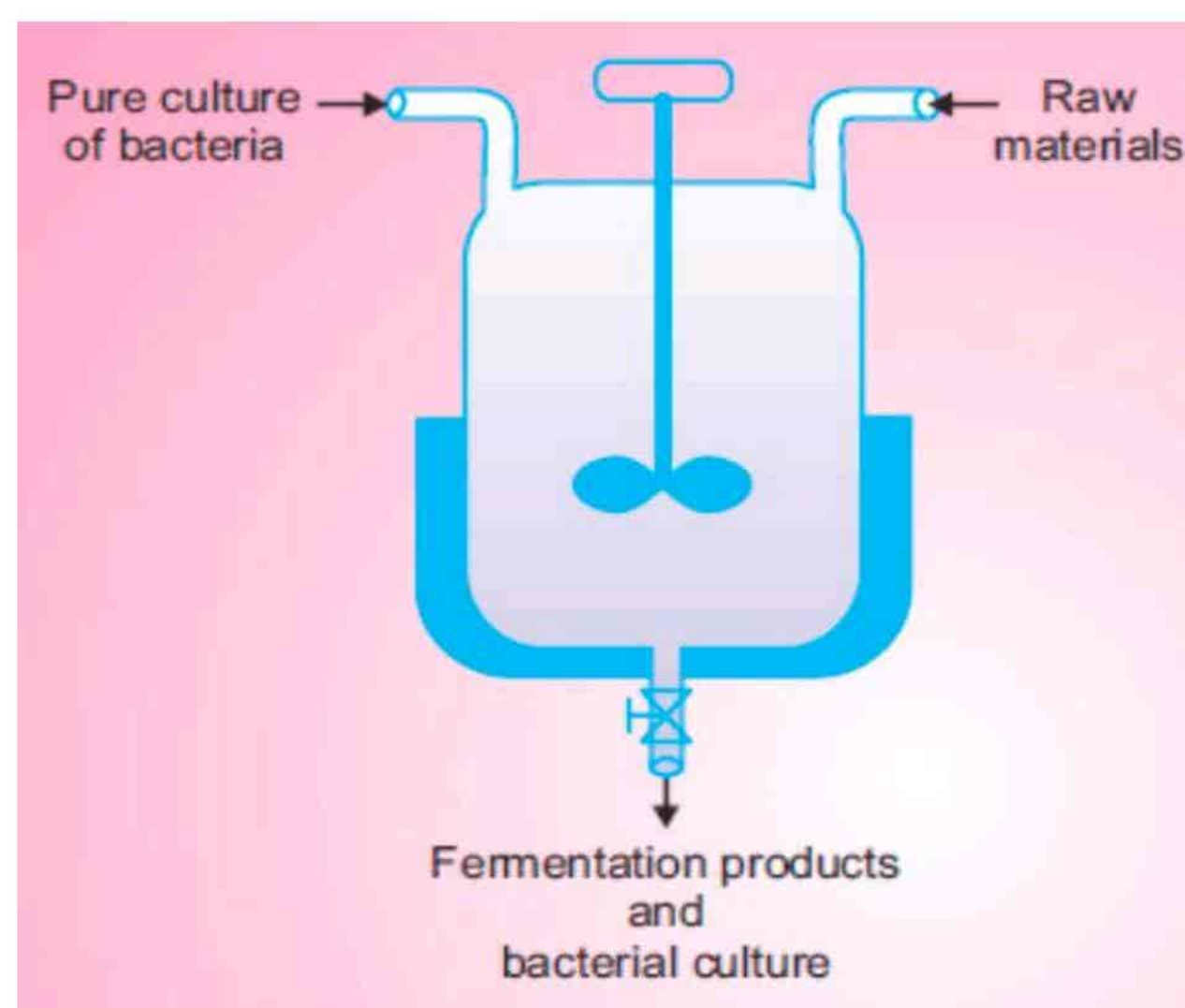


Figure : A batch fermenter

Q37: **What is batch fermentation process?**

Ans: **Batch fermentation:**

In this process, the tank of fermenter is filled with the raw materials to be fermented.

The temperature and PH for microbial fermentation is properly adjusted, and nutritive supplements are added. All the materials are steam sterilized.

The pure culture of microorganisms is added to fermenter from a separate vessel. Fermentation proceeds and after the proper time the contents of fermenter are taken out. Fermenter is clean and the process is repeated.

Q38: **Write down names of three important drugs produced with the help of biotechnology.**

Ans: Human insulin, blood clot dissolving medicines and interferon are the names of three important drugs produced with the help of biotechnology.

Q39: **What is the function of restriction endonucleases?**

Ans: Functions of restriction endonucleases is:

Restriction endonucleases are used to cut the identified gene from the total DNA of donor organism.

Q40: **What is Genetic Engineering?**

Ans: Genetic Engineering or recombinant DNA technology involves the artificial synthesis, modification, removal, addition and repair of genetic material.

Q41: **What is recombinant DNA?**

Ans: **Recombinant DNA:**

Recombinant DNA is the vector DNA and the attached gene of interest.

Q42: **Write briefly the basic steps in Genetic Engineering.**

Ans: The basic steps in Genetic Engineering are:

- ❖ Isolation of gene of interest.
- ❖ Insertion of the gene into vector.
- ❖ Transfer of recombinant into host organism.
- ❖ Growth of the GMO.
- ❖ Expression of the gene.

Q43: **Write any four achievements of Genetic Engineering.**

Ans: Achievements of Genetic Engineering are:

- ❖ In 1977, and E-Col bacterium was created that was capable by synthesizing the human growth hormone.
- ❖ The enzyme urokinase, which is used to dissolve blood clots, has been produced by genetically modified microorganisms.
- ❖ The hormone thymosin which may prove effective against brain and lung cancer has been produced by genetically modified microorganisms.

- ❖ *Beta-endorphin, a painkiller produced by the brain, has been produced by genetic engineering techniques.*

Q44: How human growth hormone was obtained before genetic engineering.

Ans: *Before Genetic engineering, 500,000 sheep brains were required to produce 5mg human growth hormone.*

Q45: When human growth hormone was prepared and by which micro-organisms.

Ans: *In 1977 and E. coli bacterium was created that was capable of synthesizing the human growth hormone.*

Q46: What are endonuclease and Ligase?

Ans: Endonuclease and Ligase:

The enzyme which breaks, called endonuclease and the enzyme which is join is called ligase.

Q47: Give two important objectives of genetic engineering.

Ans: *The important objectives of genetic engineering are as follows:*

- ❖ *Production of particular RNA and protein molecules.*
- ❖ *Isolation of a particular gene or part of a gene for various purposes such as gene therapy.*

Q48: Define biotechnology and give an example of old biotechnology.



Ans: Biotechnology:

Biotechnology is defined as the use of living organisms in processes for the manufacture of useful products or for services. Although the term biotechnology is new, the discipline itself is very old.

Fermentation and other such processes, which are based on the natural capabilities of organisms, are commonly considered as old biotechnology.

Q49: What are plasmids?

Ans: Plasmids:

The vector may be a plasmid (present in many bacteria) or a bacteriophage. These are broken pieces of DNA.

Q50: What are interferon and Urokinase?

Ans: Interferon:

Interferon are, anti-viral proteins produced by cells infected with viruses. In 1980, interferon was produced in the genetically modified microorganisms, for the first time.

Urokinase:

The enzyme urokinase which is used to dissolve blood clots has been produced by genetically modified microorganisms.



This diagram is just for information.

Figure : *Some medicines produced by genetic engineers*

Q51: Write the function of enzyme urokinase from which type of microbes it is obtained?

Ans: *The enzyme urokinase which is used to dissolve blood clots has been produced by genetically modified microorganisms.*

Q52: How biotechnology has helped us in improving the environment?

Ans: *Biotechnology is also being used for dealing with environmental issues like pollution control, development of renewable sources of energy, restoration of degraded lands and biodiversity conservation. Bacterial enzymes are used to treat sewage water to purify.*

Q53: Is inherited disease hemophilia curable? If yes then how?

Ans: *No, it has become possible to modify the genes in the human egg cell. This can lead to the elimination of inherited disease like hemophilia.*

Q54: How genetic engineers have reduced the need of fertilizers for plants?

Ans: *Genetic engineers have developed plants that can fix nitrogen directly from the atmosphere. Such plants need less fertilizer.*

Q55: What is meant by restriction endonucleases?

Ans: Isolation of the gene of interest:

In the first step, the genetic engineer identifies the gene of interest in a donor organism. Special enzymes, called restriction endonuclease, are used to cut the identified gene from the total DNA of donor organism.

Q56: What is a single cell protein? Write briefly.

Ans: Single cell protein:

Single cell protein refers to the protein content excreted from pure or mixed cultures of algae, yeast fungi or bacteria.

In single cell protein the microorganisms are grown in fermenters where they produce a high yield of protein.

Q57: Why is single cell protein gaining popularity?

Ans: *Single cell protein is gaining popularity day by day, because it requires limited land area for production.*

Q58: What is novel protein or manifold?

Ans: Novel protein or manifold:

Microorganisms grow very vigorously and produce a high yield of protein. The protein content produced by microorganisms is also known as novel protein or manifold.

Q59: Name the breaking enzyme and joining enzyme.

Ans: *Breaking enzyme and joining enzyme are:*

Breaking enzyme:

❖ *Breaking enzyme (endonuclease).*

Joining enzyme:

❖ *Joining enzyme (ligase).*

Q60: Write the names of two major techniques in biotechnology.

Ans: *The names of two major techniques in biotechnology are:*

❖ *Cross pollination of plants.*

❖ *Cross-breeding of animals.*

Q61: Write two uses of aspergillus.

Ans: *Aspergillus used in:*

❖ *Textile dying.*

❖ *In leather treatment.*

❖ *Electroplating.*

❖ *Rubber manufacturer.*

Q62: Who was professor Scrimshaw?

Ans: *Professor Scrimshaw of Massachusetts Institute of technology introduced the technique to use microbes as the producers of single cell proteins.*

Q63: What is the role of Pasteur in the field fermentation?

Ans: *In 1857, Pasteur convinced the scientific community that all fermentations are the results of microbial activity. He showed that fermentation is always accompanied by the development of microorganisms. There are many kinds of fermentation and each kind is a characteristic of particular microbial group.*

**Q64: How gene is entered into a vector? OR
What is vector in genetic engineering?**

Ans: Insertion of the gene into a vector:

A vector is selected for the transfer of the isolated gene of interest to the host cell. The vector may be a plasmid (the extra-chromosomal DNA present in many bacteria) or a bacteriophage.

The gene of interest is attached with the vector DNA by using endonuclease (breaking enzymes) and ligase (joining enzymes). The vector DNA and the attached gene of interest are collectively called recombinant DNA.

Q65: How maximum protein is obtained by yeast by genetic engineering?

Ans: All scientists recognize the significance of the production of single-cell proteins. The microorganisms grow very vigorously and produce a high yield. It has been calculated that 50 kilogram of yeast produces about 250 tons of protein within 24 hours. Algae grown in ponds produce 20 tons (dry weight) of protein per acre/year. This yield of protein is 10-15 higher than soybeans and 20-50 times higher than corn.

Q66: How single cell proteins help in controlling pollution?

Ans: When single cell proteins are produced by using yeasts, the products also contain high vitamin content. In the production of single cell proteins, individual wastes are used as raw materials for microorganisms. It helps in controlling pollution.

Q67: How did genetic engineering help in controlling hemophilia and thalassemia?

Ans: Now it has become possible to modify the genes in the human egg cell. This can lead to the elimination of infected diseases like hemophilia. Genetic engineering technique can also be used to cure blood diseases like thalassemia and sickle cell anemia, which results from defects in single genes. Normal genes- could be transferred into the bone marrow.

Q68: Why Single cell protein is gaining popularity?

Ans: Single cell protein is gaining popularity day by day because it requires limited land area for production.

Chapter : 18

Pharmacology



★ Imp.Long Questions ★

- Q.1:** Describe the scope and importance of Biotechnology. V.imp
- Q.2:** Explain group of fermented food.
- Q.3:** Define fermentation. Describe alcoholic and lactic acid fermentation.
- Q.4:** Write the advantages of using fermenters.
- Q.5:** Write objectives of genetic engineering. V.imp
- Q.6:** Write eight achievements of genetic engineering.
- Q.7:** What are Single-Cell Proteins? Describe their importance. V.imp
- Q.8:** Describe two types of fermenter.
- Q.9:** Write any four basic steps in genetic engineering. V.imp