# Fermentation

Fermentation is a chemical process that breaks down carbohydrates and other organic materials and produces energy without using oxygen. This process is carried out by microorganisms such as bacteria, molds, and fungi. Alcohol fermentation is a well-known type of fermentation where sugar is broken down into alcohol and carbon dioxide.

One of the most extraordinary scientists in history, French chemist and microbiologist (a person specializing in the study of microorganisms) Louis Pasteur (1822–1895) is considered the founder of microbiology. He also contributed to our understanding of fermentation (a chemical process that breaks down carbohydrates and other organic materials and produces energy without using oxygen), developed the germ theory of disease, improved immunization, and proved that heating kills microorganisms (an organism of microscopic size). This process of using heat was named pasteurization after the famed scientist.

Fermented products have been used by people for thousands of years, primarily to make the alcohol in beer and wine and to make bread dough rise. Although they did not understand what made it happen, the ancient Egyptians knew that if they allowed bread dough to stand for several hours, it became lighter and better tasting than if baked immediately. What they did not know was that the dough was lightened by the carbon dioxide gas produced by the fermentation of sugar. This happened not because the Egyptians knew enough to add yeast (a single-celled fungus) to the dough, but because leaving the dough uncovered allowed microscopic organisms like yeast and bacteria to float in on the breeze and break down the dough's sugars into alcohol and carbon dioxide. The carbon dioxide gas then became trapped in the dough and made it rise, while the alcohol would evaporate during baking. The Egyptians also discovered that by allowing certain grains like barley to begin to spoil, they could obtain a drink with a pleasing side effect (alcohol). The same effect could be achieved by allowing grapes to spoil since grapes contain yeast that grow naturally on their skins.

Throughout history, the process of fermentation was shrouded in mystery and superstition. During the seventeenth century, the English chemist Robert Boyle (1627–1691) correctly predicted that an understanding of the fermentation process would lead to the discovery of the causes of other phenomena like disease. Boyle's prediction came true when the French chemist, Louis Pasteur (1822–1895), proved that yeast caused fermentation in beer and wine. After this discovery, Pasteur turned his research toward the spread of diseases caused by other microorganisms.

today, fermentation is well understood and can be controlled. Fermentation is a large part of today's food industry, with some form of fermentation taking place in the production of many food products like yogurt, buttermilk, cheese, soy sauce, cured meats, pickled vegetables, and chocolate, as well as in alcoholic beverages and bread. In some cases, antibiotics and other medications can be produced by fermentation, as can ethyl alcohol that is added to gasoline to produce gasohol. Fermentation is also critical to today's disposal of solid waste by converting it to carbon dioxide, water, and mineral salts.

What is the fermentation:-

[](http://www.easybiologyclass.com/)

EASY BIOLOGY CLASS

Free Online Tutorials in Biology/Life Sciences

أعلى النموذج



أسفل النموذج

* [**Home**](http://www.easybiologyclass.com/)

* [**About Us**](http://www.easybiologyclass.com/about-us/)

* [**Biology Exams**](http://www.easybiologyclass.com/biology-exams/)

* [**CSIR – JRF / NET**](http://www.easybiologyclass.com/csir-jrf-net-life-sciences/)

* [**Jobs & News**](http://www.easybiologyclass.com/industrial-fermentation-process-batch-fed-batch-and-continuous-fermentation/)

* [**Books**](http://www.easybiologyclass.com/books-resources-teaching-aids-biology/)

* [**Contact Us**](http://www.easybiologyclass.com/easybiologyclass-contact-us/)

* [**Lecture Notes**](http://www.easybiologyclass.com/biology-life-sciences-online-resources-lecture-notes-and-study-materials-for-students-and-teachers/)

* [**Video Lectures**](http://www.easybiologyclass.com/video-lectures-tutorials/)

* [**PPT**](http://www.easybiologyclass.com/biology-power-point-ppt-pptx-presentations/)

* [**Question Bank**](http://www.easybiologyclass.com/biology-examination-question-bank-archive-of-almost-all-types-of-examinations-in-biologylife-sciences/)

* [**MCQ**](http://www.easybiologyclass.com/biology-mcq-multiple-choice-questions/)

* [**Difference between**](http://www.easybiologyclass.com/difference-between/)

* [**Practical Aids**](http://www.easybiologyclass.com/biology-practical-aids-protocols/)

Industrial Fermentation Process (Batch, Fed-batch and Continuous Fermentation)



**Fermentation Technology**  
*(Types of Industrial Fermentation Processes)*

*Fermentation: An art from the past, a skill for the future…***Brain McNeil**

***What is fermentation?***

Ø  Fermentation is a metabolic process which converts carbohydrates to alcohols, organic acids or gases by the activity of enzymes of microbial origin.

Ø   Microbes involved in fermentation process: Bacteria and Fungi.

Ø  The process of anaerobic respiration in the muscle cells of animals during exercise which produce lactic acid is also a type of fermentation.

Ø  The technique of fermentation was very ancient in origin.

Ø  Egyptians and Sumerians had the knowledge of the technique of converting starchy grains to alcoholics.

Ø  For a microbiologist, the word ‘fermentation’ means many processes such as:

$   A method of mass cultivation of microbes under aerobic or anaerobic conditions.

$   Any biological process occurs in the absence of oxygen.

$   Spoilage of food by microbial activity.

$   Production of alcoholic beverages, organic acids, antibiotics or biopolymers

$   Partial oxidation of carbohydrates

***What is industrial fermentation?***

Ø  The intentional use of fermentation technology for the large scale production of microbial biomass or metabolites is called industrial fermentation.

Ø  Fermented products have immense use in food, medicine and other industries.

Ø  Modern industrial fermentation units use genetically engineered microbes for the rapid production of desired metabolites.

***What is a fermenter?***

Ø  The heart of industrial fermentation is a ‘Fermenter’.

Ø  Fermenter is type of bioreactor\*

Ø  Fermenter: a system provided with controlled environmental conditions for the growth of microbes in liquid culture and production of specific metabolites.

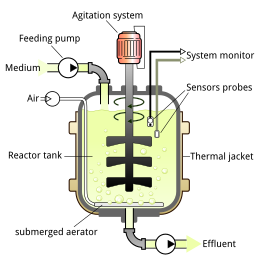
Ø  It is a device in which the microbes are cultivated and motivated to form the desired products.

Ø  It is containment system to provide the accurate environment for the optimum growth and metabolic activity of the microbes.

Ø  Fermenter prevents the entry and growth of contaminating microbes from outside.

Ø  Fermenter: containment system for the cultivation of prokaryotic cells (bacteria) and fungi

Ø  Bioreactor: containment system for the cultivation of mammalian or insect cells

[](https://commons.wikimedia.org/wiki/File:Bioreactor_principle.svg)

*Fermenter (Source: Wikipedia)*

**What are the main parts of a fermenter and their uses?**

Ø  A fermenter possesses the following mechanical parts:

$.  A large vessel made of stainless or rust free material.

$.   Motors provided with an automatic control system.

$.  Heaters with thermostat system for providing and manipulating temperature.

$.  Pups for the addition or removal of substances and water to the fermenter.

$.  Gas source and pipeline system for aeration.

$.  Sensors for pH and aeration.

$.  Peripheral manual or automatic controlling facilities.

Ø  The mechanical components of the fermenter proves:

$.  A space for taking raw material (culture media / carbon source)

$.  Provide a contamination free environment for the growth of microbes.

$.  Maintain optimum temperature in the system.

$. Provide adequate mixing and agitation in the medium.

$.  Provide ample aeration for aerobic fermentation.

$.  Control and maintain optimum pH condition in the fermenter

$.  Monitor the concentration of dissolved oxygen in the system

$.  Allow the addition of nutrients in between the fermentation process (in continuous fermentation)

$.  Facility for maintaining a wide range of organisms.

$.  Provision for collecting over-flow from the fermenter (in continuous fermentation)

***What are the different types of fermentation process / methods?***

Ø  There are three types of industrial fermentation processes based on the methods of fermentation and types of fermenters.

**(1).  Batch fermentation**

**(2).  Continuous fermentation**

**(3).  Fed-batch fermentation**

***(1). Batch Fermentation***

Ø  Microorganism is inoculated into a fixed volume of medium.

Ø  As the growth takes place, the nutrients are consumed and the product of growth accumulates in the fermenter.

Ø  Product of growth may be of two types: (a) Biomass and (b). Metabolites.

Ø  The nutrient environment in the fermenter is continuously changed.

Ø  This change in the environment in the fermenter will enforce change in the metabolism of cells.

Ø  This also results in the cessation of cell multiplication.

Ø  Cessation of growth is due to the scarcity of nutrients and accumulation of metabolites.

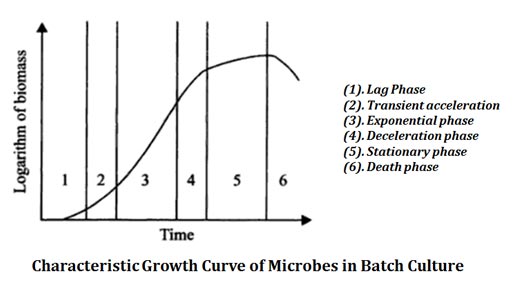
Ø  Once the microbes reached the stationary phase they start to accumulate the metabolites.

Ø  Metabolites are extracted from the fermenter by downstream processes.

Ø  After the fermentation is over, the residues are taken out from the fermentation tank, and the vessel is then cleaned and sterilized before next batch of fermentation.

Ø  Thus in batch fermentation, the large scale production is done as separates ‘batches’.

Ø  Microbes in the batch culture show the following pattern of growth with distinct phases.

**(1). Log phase:** initial phase, no apparent growth of microbes, they adapt to the environmental conditions.

**(2). Transient acceleration:** the inoculum begins to grow slowly.

**(3). Exponential phase:** microbial growth proceeds at the maximum possible rate.

**(4). Deceleration phase:** decline in the growth rate of microbes

**(5).  Stationary phase:** no overall growth rate (death of the cells equals to the division of cells). Most of the secondary metabolites are produced in this phase.

**(6). Death phase:** no growth at all, cells starts to die and the population size decreases. Usually the fermentation stops before the death phase.

***(2). Continuous Fermentation***

Ø  Here the exponential growth rate of the microbes is maintained in the fermenter for prolonged periods of time in by the addition of fresh media are regular intervals.

Ø  Microbes reach the exponential growth rate and continue as such due to the availability of nutrients.

Ø  The exponential growth rate of microbes continues till the vessel becomes completely filled in the cells.

Ø  Continuous fermenter possesses devices for the collection of overflow from the vessel.

Ø  The metabolite or the product of fermentation is extracted for the overflow by downstream processing.

Ø  Thus unlike batch fermentation, in continuous fermentation, the fermentation process never stops in between and it continues to run for a long period of time with the addition of nutrients and harvesting the metabolites at regular intervals.

*Learn more: [Difference between Batch Fermentation and Continuous Fermentation](http://www.easybiologyclass.com/batch-fermentation-vs-continuous-fermentation-process-similarities-and-differences-a-comparison-table/" \t "_blank)*

***3. Fed-batch fermentation***

Ø  It is a modified version of batch fermentation.

Ø  Here the substrate is added in increments at different times throughout the course of fermentation.

Ø  Periodical addition of substrate keeps the prolonged log and stationary phase of the microbes in the fermenter.

Ø  This results in the rapid increase of biomass.

Ø  Consequently increased production of metabolites can be achieved in the stationary phase.

Ø  Thus fed-batch technique is an improved version of fermentation by avoiding the disadvantages of batch and continuous fermentation techniques.

أعلى النموذج

**Get our Updates on BIOTECHNOLOGY in your E-mail Inbox***We will not spam your account…Enter your e-mail address*





*Don’t forgot to****Activate****your Subscription…. Please See Your E-Mail Inbox*

***You may also like…***

@. [Difference between Batch and Continuous Fermentation Methods](http://www.easybiologyclass.com/batch-fermentation-vs-continuous-fermentation-process-similarities-and-differences-a-comparison-table/" \t "_blank)

@. Advantages and Disadvantages of Batch, Fed-Batch and Continuous Fermentation Methods

@. Advantages and Disadvantages of Solid Substrate Fermentation and Liquid Substrate Fermentation

@. [Enzyme Immobilization: Methods and Applications](http://www.easybiologyclass.com/enzyme-cell-immobilization-techniques/" \t "_blank)

@. [Biotechnology Lecture Notes](http://www.easybiologyclass.com/topic-biotechnology/" \t "_blank)

***Please Share for your Students, Colleagues, Friends and Relatives…***

أسفل النموذج

[](http://www.facebook.com/sharer.php?u=http://www.easybiologyclass.com/industrial-fermentation-process-batch-fed-batch-and-continuous-fermentation/&t=Industrial%20Fermentation%20Process%20(Batch,%20Fed-batch%20and%20Continuous%20Fermentation)&s=100&p%5burl%5d=http://www.easybiologyclass.com/industrial-fermentation-process-batch-fed-batch-and-continuous-fermentation/&p%5bimages%5d%5b0%5d=http://www.easybiologyclass.com/wp-content/uploads/2015/04/Biotechnology-easybiologyclass.jpg&p%5btitle%5d=Industrial%20Fermentation%20Process%20(Batch,%20Fed-batch%20and%20Continuous%20Fermentation))[](https://twitter.com/intent/tweet?url=http://www.easybiologyclass.com/industrial-fermentation-process-batch-fed-batch-and-continuous-fermentation/&text=Hey%20check%20this%20out)[](https://plus.google.com/share?url=http://www.easybiologyclass.com/industrial-fermentation-process-batch-fed-batch-and-continuous-fermentation/)[](http://pinterest.com/pin/create/button/?url=http://www.easybiologyclass.com/industrial-fermentation-process-batch-fed-batch-and-continuous-fermentation/&media=http://www.easybiologyclass.com/wp-content/uploads/2015/04/Biotechnology-easybiologyclass.jpg&description=Industrial%20Fermentation%20Process%20(Batch,%20Fed-batch%20and%20Continuous%20Fermentation))[](http://www.linkedin.com/shareArticle?mini=true&url=http://www.easybiologyclass.com/industrial-fermentation-process-batch-fed-batch-and-continuous-fermentation/&title=Industrial%20Fermentation%20Process%20(Batch,%20Fed-batch%20and%20Continuous%20Fermentation))

**Related Posts:**

1. **[Batch Fermentation vs Continuous Fermentation Process: Similarities and Differences – A Comparison Table](http://www.easybiologyclass.com/batch-fermentation-vs-continuous-fermentation-process-similarities-and-differences-a-comparison-table/" \o "Batch Fermentation vs Continuous Fermentation Process: Similarities and Differences – A Comparison Table)**
2. **[Industrial and Food Microbiology May 2012 MGU MSc Botany](http://www.easybiologyclass.com/biology-examination-question-bank-archive-of-almost-all-types-of-examinations-in-biologylife-sciences/mahatma-gandhi-mg-university-previous-year-question-paper-archive/industrial-food-microbiology-may-2012-mgu-msc-botany/" \o "Industrial and Food Microbiology May 2012 MGU MSc Botany)**
3. **[GATE Syllabus: Biotechnology (BT) Latest – 2015](http://www.easybiologyclass.com/biology-exams/gate-syllabus-biotechnology-bt-latest-2015/" \o "GATE Syllabus: Biotechnology (BT) Latest – 2015)**
4. **[Enzyme Immobilization Methods and Applications (Biotechnology Lecture Notes)](http://www.easybiologyclass.com/enzyme-cell-immobilization-techniques/" \o "Enzyme Immobilization Methods and Applications (Biotechnology Lecture Notes))**
5. **[Cell Cycle Checkpoints in Regulation of Cell Division and Cancer](http://www.easybiologyclass.com/cell-cycle-checkpoints-regulation-cancer/" \o "Cell Cycle Checkpoints in Regulation of Cell Division and Cancer)**
6. **[Biotechnology: Online Tutorials, Lecture Notes, PPTs & Study Materials](http://www.easybiologyclass.com/topic-biotechnology/" \o "Biotechnology: Online Tutorials, Lecture Notes, PPTs & Study Materials)**

Posted in [Biotechnology](http://www.easybiologyclass.com/category/biotechnology/), [Lecture Notes](http://www.easybiologyclass.com/category/lecture-notes/), [Microbiology](http://www.easybiologyclass.com/category/microbiology/) and tagged [Batch Fermentation](http://www.easybiologyclass.com/tag/batch-fermentation/), [Biotechnology Lecture Notes](http://www.easybiologyclass.com/tag/biotechnology-lecture-notes/), [Continuous Fermentation](http://www.easybiologyclass.com/tag/continuous-fermentation/), [CSIR / ICMR / DBT / ICAR](http://www.easybiologyclass.com/tag/csir-icmr-dbt-icar/), [Fed-Batch Fermentation](http://www.easybiologyclass.com/tag/fed-batch-fermentation/), [Fermentation](http://www.easybiologyclass.com/tag/fermentation/), [Industrial Fermentation](http://www.easybiologyclass.com/tag/industrial-fermentation/), [Life Science NET Study Materials](http://www.easybiologyclass.com/tag/life-science-net-study-materials/).

Post navigation

**[← Artery vs Vein: Similarities and…](http://www.easybiologyclass.com/artery-vs-vein-similarities-and-differences-a-comparison-table/)**

**[Batch Fermentation vs Continuous Fermentation… →](http://www.easybiologyclass.com/batch-fermentation-vs-continuous-fermentation-process-similarities-and-differences-a-comparison-table/)**

Leave a Reply

أعلى النموذج

Your email address will not be published. Required fields are marked \*

Comment

Name \*

Email \*

Website



أسفل النموذج

[](http://www.easybiologyclass.com/biology-examination-question-bank-archive-of-almost-all-types-of-examinations-in-biologylife-sciences/)

**Related Posts**

1. [Batch Fermentation vs Continuous Fermentation Process: Similarities and Differences – A Comparison Table](http://www.easybiologyclass.com/batch-fermentation-vs-continuous-fermentation-process-similarities-and-differences-a-comparison-table/)
2. [Industrial and Food Microbiology May 2012 MGU MSc Botany](http://www.easybiologyclass.com/biology-examination-question-bank-archive-of-almost-all-types-of-examinations-in-biologylife-sciences/mahatma-gandhi-mg-university-previous-year-question-paper-archive/industrial-food-microbiology-may-2012-mgu-msc-botany/)
3. [GATE Syllabus: Biotechnology (BT) Latest – 2015](http://www.easybiologyclass.com/biology-exams/gate-syllabus-biotechnology-bt-latest-2015/)
4. [Enzyme Immobilization Methods and Applications (Biotechnology Lecture Notes)](http://www.easybiologyclass.com/enzyme-cell-immobilization-techniques/)
5. [Cell Cycle Checkpoints in Regulation of Cell Division and Cancer](http://www.easybiologyclass.com/cell-cycle-checkpoints-regulation-cancer/)
6. [Biotechnology: Online Tutorials, Lecture Notes, PPTs & Study Materials](http://www.easybiologyclass.com/topic-biotechnology/)

**Recent Posts**

Folded Fibre Model of Chromosomes

[Folded Fibre Model of Chromosomes](http://www.easybiologyclass.com/folded-fibre-model-of-chromosomes/" \o "Folded Fibre Model of Chromosomes)

February 1st, 2017

Karyotype and Idiogram: Definition and Importance of Karyotype Test (Karyotyping) in Human

[Karyotype and Idiogram: Definition and Importance of Karyotype Test (Karyotyping) in Human](http://www.easybiologyclass.com/karyotype-and-idiogram-definition-and-importance-of-karyotype-test-karyotyping-in-human/" \o "Karyotype and Idiogram: Definition and Importance of Karyotype Test (Karyotyping) in Human)

January 28th, 2017

Classification of Chromosomes based on Position of Centromere and Length of Chromosomal Arms

[Classification of Chromosomes based on Position of Centromere and Length of Chromosomal Arms](http://www.easybiologyclass.com/classification-of-chromosome-based-on-position-of-centromere-and-length-of-chromosomal-arms/" \o "Classification of Chromosomes based on Position of Centromere and Length of Chromosomal Arms)

January 27th, 2017

DBT BET JRF Exam 2017 Model Questions with Answer Key and Explanations Part 1

[DBT BET JRF Exam 2017 Model Questions with Answer Key and Explanations Part](http://www.easybiologyclass.com/dbt-bet-jrf-exam-2017-model-questions-with-answer-key-and-explanations-part-1/" \o "DBT BET JRF Exam 2017 Model Questions with Answer Key and Explanations Part 1)

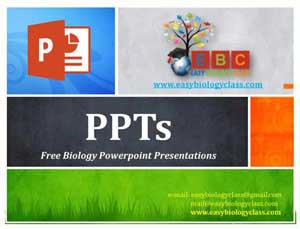
January 26th, 2017

Kerala PSC Botany Lecturer Exam 2017 Model Question Paper 3/3

[Kerala PSC Botany Lecturer Exam 2017 Model Question Paper 3/3](http://www.easybiologyclass.com/kerala-psc-botany-lecturer-exam-2017-model-question-paper-33/" \o "Kerala PSC Botany Lecturer Exam 2017 Model Question Paper 3/3)

January 24th, 2017

**Video Tutorials: YouTube**

[](http://www.easybiologyclass.com/biology-power-point-ppt-pptx-presentations/)

**CATEGORIES**

* [Algae](http://www.easybiologyclass.com/category/difference-between/algae/) (1)
* [Algae (Phycology)](http://www.easybiologyclass.com/category/botany/algae-phycology/) (4)
* [Biochemistry](http://www.easybiologyclass.com/category/biochemistry/" \o "easybiologyclass tutorials in biochemistry) (30)
* [Biochemistry MCQ](http://www.easybiologyclass.com/category/biology-mcq/biochemistry-mcq/) (3)
* [Biology Exams & Notifications](http://www.easybiologyclass.com/category/biology-exams-notifications/) (25)
* [Biology MCQ](http://www.easybiologyclass.com/category/biology-mcq/) (15)
* [Biophysics](http://www.easybiologyclass.com/category/biophysics/) (2)
* [Biotechnology](http://www.easybiologyclass.com/category/biotechnology/) (9)
* [Biotechnology](http://www.easybiologyclass.com/category/difference-between/biotechnology-difference-between/) (1)
* [Biotechnology MCQ](http://www.easybiologyclass.com/category/biology-mcq/biotechnology-mcq/) (1)
* [Botany](http://www.easybiologyclass.com/category/botany/) (40)
* [Bryophyte](http://www.easybiologyclass.com/category/botany/bryophyte/) (2)
* [Cell Biology](http://www.easybiologyclass.com/category/cell-biology/) (4)
* [CSIR / ICMR / DBT / ICAR](http://www.easybiologyclass.com/category/csir-icmr-dbt-icar/) (55)
* [CSIR NET Model Questions](http://www.easybiologyclass.com/category/csir-icmr-dbt-icar/csir-net-model-questions/) (14)
* [Cytology MCQ](http://www.easybiologyclass.com/category/biology-mcq/cytology-mcq/) (1)
* [DBT BET Exam](http://www.easybiologyclass.com/category/dbt-bet-exam/) (1)
* [DBT BET JRF Previous Year Questions](http://www.easybiologyclass.com/category/dbt-bet-jrf-previous-year-questions/)(10)
* [Difference Between…](http://www.easybiologyclass.com/category/difference-between/) (22)
* [Ecology](http://www.easybiologyclass.com/category/ecology/) (7)
* [Ecology & Environmental Science](http://www.easybiologyclass.com/category/difference-between/ecology-environmental-science/) (1)
* [Ecology MCQ](http://www.easybiologyclass.com/category/biology-mcq/ecology-mcq/) (4)
* [Environmental Science](http://www.easybiologyclass.com/category/environmental-science/) (1)
* [Enzymes](http://www.easybiologyclass.com/category/enzymes/) (1)
* [Evolution](http://www.easybiologyclass.com/category/evolution/) (1)
* [GATE Biotechnology](http://www.easybiologyclass.com/category/gate-biotechnology/) (7)
* [GATE EY Previous Papers](http://www.easybiologyclass.com/category/gate-ey-previous-papers/) (2)
* [GATE Life Sciences (XL)](http://www.easybiologyclass.com/category/gate-life-sciences-xl/) (12)
* [GATE XL Previous Year Questions](http://www.easybiologyclass.com/category/gate-xl-previous-year-questions/) (8)
* [Genetics](http://www.easybiologyclass.com/category/genetics/) (3)
* [GS Biology Previous Papers (Solved)](http://www.easybiologyclass.com/category/gs-biology-previous-papers-solved/) (7)
* [GS Biology Wildlife & Conservation](http://www.easybiologyclass.com/category/gs-biology-wildlife-conservation/) (4)
* [HSST Botany Question Papers](http://www.easybiologyclass.com/category/hsst-botany-question-papers/) (2)
* [Human Physiology](http://www.easybiologyclass.com/category/difference-between/human-physiology/) (2)
* [ICMR JRF Model Questions](http://www.easybiologyclass.com/category/csir-icmr-dbt-icar/icmr-jrf-model-questions/) (15)
* [JAM BL Previous Papers](http://www.easybiologyclass.com/category/jam-bl-previous-papers/) (6)
* [JAM BT Previous Papers](http://www.easybiologyclass.com/category/jam-bt-previous-papers/) (10)
* [Jobs & Recruitments](http://www.easybiologyclass.com/category/jobs-recruitments/) (10)
* [Lecture Notes](http://www.easybiologyclass.com/category/lecture-notes/) (59)
* [Lichens](http://www.easybiologyclass.com/category/botany/lichens/) (1)
* [MCQ (Multiple Choice Questions)](http://www.easybiologyclass.com/category/mcq-multiple-choice-questions/) (44)
* [Microbiology](http://www.easybiologyclass.com/category/microbiology/) (11)
* [Microbiology MCQ](http://www.easybiologyclass.com/category/biology-mcq/microbiology-mcq/) (5)
* [Molecular Biology](http://www.easybiologyclass.com/category/molecular-biology/) (9)
* [Molecular Biology MCQ](http://www.easybiologyclass.com/category/biology-mcq/molecular-biology-mcq/) (1)
* [Mycology: Fungi](http://www.easybiologyclass.com/category/botany/mycology-fungi/) (7)
* [NET Life Sciences Model Questions](http://www.easybiologyclass.com/category/net-life-sciences-model-questions/) (10)
* [Nobel Prize Discoveries](http://www.easybiologyclass.com/category/nobel-prize-discoveries/) (4)
* [Physiology and Metabolism](http://www.easybiologyclass.com/category/physiology-and-metabolism/) (2)
* [Plant Anatomy](http://www.easybiologyclass.com/category/botany/plant-anatomy/) (20)
* [Plant Anatomy](http://www.easybiologyclass.com/category/difference-between/plant-anatomy-difference-between/) (5)
* [Plant Pathology](http://www.easybiologyclass.com/category/botany/plant-pathology/) (1)
* [PPTs: Plant Anatomy](http://www.easybiologyclass.com/category/ppts-plant-anatomy/) (1)
* [Previous Year Question Paper](http://www.easybiologyclass.com/category/csir-icmr-dbt-icar/previous-year-question-paper/) (38)
* [Proteins](http://www.easybiologyclass.com/category/biochemistry/proteins/) (2)
* [Public Service Commission (PSC)](http://www.easybiologyclass.com/category/public-service-commission-psc/) (13)
* [Question Bank](http://www.easybiologyclass.com/category/question-bank/) (54)
* [Scientist Jobs in Biology/Life Sciences](http://www.easybiologyclass.com/category/jobs-recruitments/scientist-jobs-in-biologylife-sciences/) (3)
* [SET Life Science Solved Papers](http://www.easybiologyclass.com/category/set-life-science-solved-papers/) (2)
* [Uncategorized](http://www.easybiologyclass.com/category/uncategorized/) (6)
* [University Question Paper Archive](http://www.easybiologyclass.com/category/university-question-paper-archive/) (1)
* [Video tutorials](http://www.easybiologyclass.com/category/video-tutorials/) (4)
* [Zoology](http://www.easybiologyclass.com/category/zoology/) (4)

**Popular Posts**

* [Enzyme Immobilization Methods and A...](http://www.easybiologyclass.com/enzyme-cell-immobilization-techniques/" \o "Enzyme Immobilization Methods and Applications (Biotechnology Lecture Notes)" \t "_blank)
* [CSIR JRF NET Life Sciences December...](http://www.easybiologyclass.com/csir-jrf-net-life-sciences-december-2016-original-solved-question-paper-download-pdf/" \o "CSIR JRF NET Life Sciences December 2016 Original Solved Question Paper (Download PDF)" \t "_blank)
* [Difference Between Gram Positive an...](http://www.easybiologyclass.com/difference-between-gram-positive-and-gram-negative-bacteria-comparison-chart/" \o "Difference Between Gram Positive and Gram Negative Bacteria" \t "_blank)
* [Difference Between Dicot and Monoco...](http://www.easybiologyclass.com/difference-between-dicot-and-monocot-stem-anatomy-a-comparison-table/" \o "Difference Between Dicot and Monocot Stem (Anatomy): A Comparison Table" \t "_blank)
* [Difference Between Animal Fats and...](http://www.easybiologyclass.com/difference-between-animal-fats-and-plant-fats-oils/" \o "Difference Between Animal Fats and Plant Fats" \t "_blank)

**Please LIKE Me…**

أعلى النموذج

**Subscribe Me by E-mail***I will not spam your account...Enter your e-mail address*



أسفل النموذج

**[Home](http://www.easybiologyclass.com/)**

**[About us](http://www.easybiologyclass.com/about-us/)..**

**[Contact us.](http://www.easybiologyclass.com/easybiologyclass-contact-us/)**

**[Privacy policy](http://www.easybiologyclass.com/privacy-policy/" \t "_blank)**

**[Disclaimer](http://www.easybiologyclass.com/easy-biology-class-disclaimer/" \t "_blank)**

**[Subscribe us by E-mail](https://feedburner.google.com/fb/a/mailverify?uri=Easybiologyclass&loc=en_US" \t "_blank)**

**Follow Easy Biology Class on....**

http://www.easybiologyclass.com/wp-content/plugins/wordpress-hit-counter/styles/Classic/blgrv/2.gifhttp://www.easybiologyclass.com/wp-content/plugins/wordpress-hit-counter/styles/Classic/blgrv/1.gifhttp://www.easybiologyclass.com/wp-content/plugins/wordpress-hit-counter/styles/Classic/blgrv/6.gifhttp://www.easybiologyclass.com/wp-content/plugins/wordpress-hit-counter/styles/Classic/blgrv/5.gifhttp://www.easybiologyclass.com/wp-content/plugins/wordpress-hit-counter/styles/Classic/blgrv/6.gifhttp://www.easybiologyclass.com/wp-content/plugins/wordpress-hit-counter/styles/Classic/blgrv/5.gifhttp://www.easybiologyclass.com/wp-content/plugins/wordpress-hit-counter/styles/Classic/blgrv/6.gif

© easybiologyclass 2017

A [SiteOrigin](https://siteorigin.com/) Theme

In the biochemical sense the term fermentation refer to a metabolic process