Fermentation

Created: Tuesday, 26 July 2011 09:31 | Published: Tuesday, 26 July 2011 09:31 | Written by Super User | Print

What is a Fermentation?



Fermentation generally means respiration of an organism without the use of oxygen. Some

bacteria and yeast often spoil food they live in, and some are useful to the mankind. They produce <u>antibiotics</u>, enzymes, washing powder, alcohol, yoghurt, and other useful food items and products. To make use of these we need to grow these microbes in large scale. This is called bio-processing and involves culturing them in the nutrient field in a stainless steel vessel call bioreactor or fermentor.

Occurrence:

- 1. Fermentation occurs in certain bacteria and fungi
- 2. It takes place in the absence of 02
- 3. It is extracellular
- 4. The end products are C02, ethyl alcohol, lactic acid and other organic acids
- 5. Food materials are partially oxidised
- 6. In fermentation, one glucose molecule produces only 2 ATP
- 7. The fermentation requires enzyme zymase particularly in case of carbohydrates

Steps for fermentation

Lactic Acid Fermentation

The metabolism of carbohydrates meets with different fates as it is subjected to different enzyme systems, different locales of reaction and most importantly, the presence or absence of oxygen.

The <u>carbohydrates</u> like glucose, fructose, etc., breakdown into two molecules of pyruvate. In the presence of oxygen, the pyruvate is oxidised into CO2 and water with liberating of energy.



into lactic acid by the process of lactic acid fermentation as seen in humans and other mammals.

 $C_{6}H_{12}O_{6} + 2NAD^{+} + 2ADP --->glucose$

 $2CH_{3}COCOOH + 2 ATP + 2 NADH + 2H^{+} pyruvate$

The hydrogen atoms held by NADH are transferred to pyruvate, which in the process is reduced to lactate.

Glycolysis

The breakdown of food molecules into simple sugars which take place in a human body is called glycolysis. It means splitting of sugar molecule into two molecules of pyruvic acid is called glycolysis. It generally takes place in the cytoplasm and the path way used is called anaerobic pathway.

Difference between glycolysis and fermentation:

<u>Glycolysis</u> is the path where glucose is broken into pyruvate and fermentation of process of formation of lactic acid by breaking pyruvates. They produce reducing agents without oxygen. Glycolysis appears before fermentation .They both occur in the cytoplasm.

What is cellular respiration?

Want to know more about Glycolysis? Click here to schedule a live help with an eTutor!

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Reference Links:

- http://en.wikipedia.org/wiki/Metabolic_pathway
- http://en.wikipedia.org/wiki/Fermentation_%28biochemistry%29
- http://en.wikipedia.org/wiki/Glycolysis
- http://en.wikipedia.org/wiki/Anaerobic_respiration
- <u>http://en.wikipedia.org/wiki/Cellular_respiration</u>
- http://en.wikipedia.org/wiki/Aerobic_organism
- http://www.youtube.com/watch?v=OUAKTOoTNWI

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