

ANAEROBIC RESPIRATION

DEFINITION

The incomplete breakdown of glucose without the utilization of oxygen is called anaerobic respiration.

EXPLANATION

Anaerobic Respiration (Fermentation) occurs in the absence of oxygen. It involves incomplete breakdown of organic food molecule and only a small amount of energy is released. ~~Pyruvate~~

CONDITIONS

Pyruvate formed in glycolysis has two pathways. In human cells it depends on the availability of oxygen. If oxygen is available then pyruvic acid is completely degraded into CO_2 and water in mitochondria i.e. aerobic respiration. If oxygen is not available then anaerobic respiration continues and fermentation occurs.

STEPS

The process of fermentation consists of two steps i.e. glycolysis and the

reduction of pyruvate into alcohol or lactate

TYPES

Anaerobic respiration is of two types i.e. lactic Acid Fermentation and Alcoholic Fermentation.

If a cell able to perform aerobic respiration is in a situation where there is no oxygen (such as muscles under extreme exertion), it will move into a type of anaerobic respiration called lactic acid fermentation.

Some cells such as yeast are unable to ~~move into~~ carry out aerobic respiration and will automatically move into a type of anaerobic respiration called alcoholic fermentation.

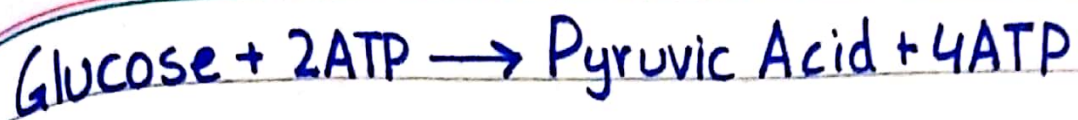
1. LACTIC ACID FERMENTATION

OCCURANCE

This form of fermentation occurs in muscle cells of human and in many microorganisms. It occurs in two steps.

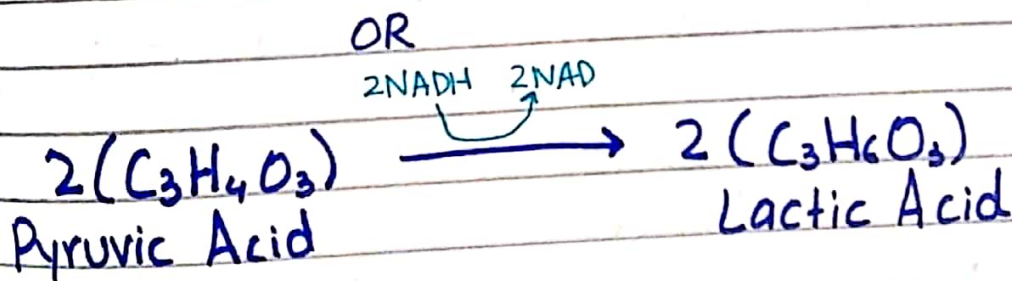
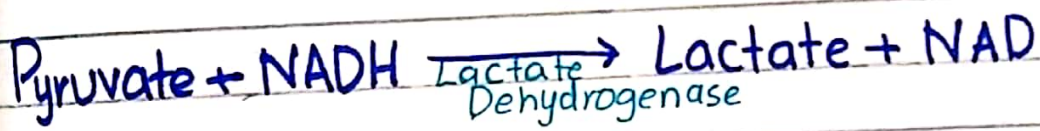
GLYCOLYSIS

In the first step glucose is broken down into pyruvic acid which is basically glycolysis. ~~and~~ ~~NAD~~ is reduced to ~~NADH~~.



REDUCTION OF PYRUVATE

In the next step pyruvic acid is reduced by NADH_2 into lactic acid in the presence of enzyme lactate dehydrogenase (LDH). The hydrogen from the NADH molecule is transferred to the pyruvate molecule. This results in the molecule lactate. From the lactate product, lactic acid can be formed, which causes the muscles fatigue that accompanies strenuous workouts where oxygen becomes deficient.



ENERGY OUTPUT

Compared to aerobic respiration which yields 36 ATP molecules from the breakdown of one glucose, anaerobic respiration yields only 2 ATP molecules. Despite its low yield of ATP, anaerobic respiration has its importance bcz of rapid production of ATP (energy) when demanded.

2. ALCOHOLIC FERMENTATION

Alcoholic Fermentation is brought about by microorganisms. This type of anaerobic respiration also completes in two steps:

* Alcoholic fermentation converts ~~yeast~~ ^{pyruvic Acid} into ethyl alcohol and CO_2 .

GLYCOLYSIS

First step is the same glycolysis during which glucose molecule is broken down into two molecules of pyruvic acid and NAD is reduced to NADH_2 .

ACETALDEHYDE

With the help of enzyme pyruvate decarboxylase, a CO_2 molecule is removed from pyruvate to yield an acetaldehyde.

REDUCTION

The acetaldehyde is then reduced by the enzyme alcohol dehydrogenase which transfers the hydrogen from NADH to the acetaldehyde to yield NAD and ethanol. This enzyme is not found in humans.

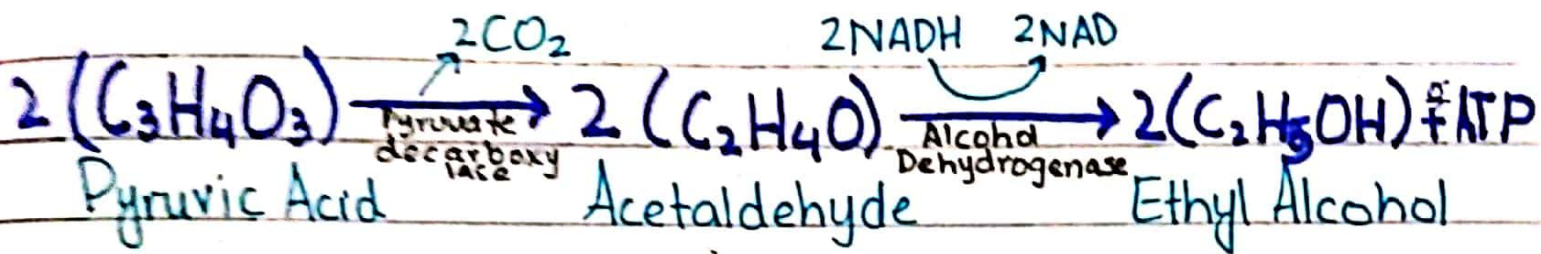
ENERGY OUTPUT

In alcoholic fermentation also 2 ATP molecules are produced from

one glucose molecule.

END PRODUCT

This is called alcoholic fermentation bc2 alcohol is produced at the end.



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