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CLASS 11 & 12th



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CLASS 11th

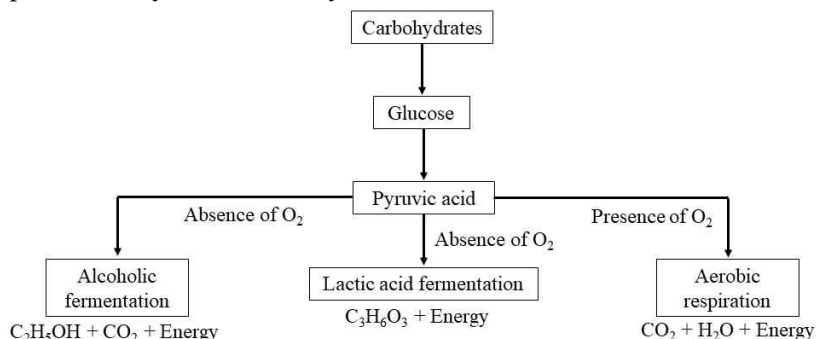
Respiration in Plants

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Fate of pyruvic acid

Pyruvic acid is the end product of glycolysis. Its fate depends upon the availability of oxygen in the cell. Three major ways in which cells handle pyruvic acid are lactic acid fermentation, alcoholic fermentation and aerobic respiration. The relationship between aerobic and anaerobic respiration is represented by Pfeffer-Kostychev scheme below

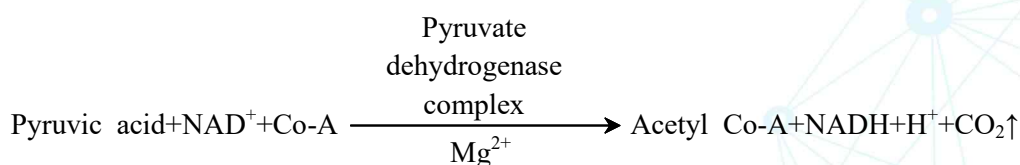


Breakdown of Pyruvic Acid

The breakdown of pyruvic acid formed during glycolysis occurs in following two steps

(i) Oxidative Decarboxylation of Pyruvic Acid

The pyruvic acid formed in glycolysis moves into the mitochondria. Here, oxidative decarboxylation of pyruvic acid takes place. During this process, pyruvic acid is first decarboxylated, i.e. releases CO_2 . It is then dehydrogenated by removing H-atom. Thus, 3-C pyruvic acid is converted into 2-C acetyl coenzyme-A. This process is catalysed by a large enzyme complex called **pyruvate dehydrogenase**. This enzymes complex consists of Mg^{2+} , thiamine pyrophosphate, NAD, coenzyme-A and lipoic acid as cofactors. This complete process takes place in perimitochondrial, space. The reaction for this process is as follows



Acetyl Co-A formed above reacts with oxaloacetate in Krebs' cycle. Thus, this step is considered as the connective link between glycolysis and krebs' cycle.

(ii) Tricarboxylic Acid or Krebs' Cycle

This cycle is also called as **citric acid cycle**, because citric acid is the first product of this cycle. It was discovered by Sir Hans Krebs' in 1937. In eukaryotic organisms, all reactions of Krebs' cycle take place in the mitochondrial matrix. Thus, all enzymes of this cycle are also found in matrix except succinic or succinate dehydrogenase. This enzymes is found to be located in the inner membrane of mitochondria. In prokaryotes, Krebs' cycle occurs in cytoplasm. The overall reaction of aerobic degradation of pyruvic acid is as follows. (This indudes oxidative decarboxylation and TCA)

