Glycolysis

It is also known as EMP Embden-Meyerhof pathway or Embden-Meyerhof-Parnas pathway. **It occurs in cytosol or cytoplasm.**

(i) Phosphorylation of Glucose. Respiratory substrate is formed by hydrolysis of starch (enzymes amylase and maltase) and sucrose (enzyme invertase). It is glucose or fructose. Glucose is first phosphorylated with ATP and hexokinase enzyme (+ Mg^{2+})to form glucose 6-P.

(ii) Formation of Fructose 6-Phosphate. Glucose 6 - P is changed into its isomer fructose G-phosphate (enzyme phosphohexose isomerase). The latter is also formed from fructose in the presence of fructokinase, ATP and Mg^{2+}.

(iii) Second Phosphorylation. Fructose 6 - P is phosphorylated again with the help of ATP ($Mg^{2+}$and enzyme phosphofructokinase) to produce fructose 1, 6-diphosphate.

(iv) Lysis. Fructose 1,6-diphosphate breaks into glyceraldehyde 3 - P and its isomer dihydroxy acetone 3-P (enzyme aldolase).

(v) Isomerisation of DiHAP. With the help of enzyme phosphotriose isomerase dihydroxyacetone 3-P is changed to glyceraldehyde 3-P. Glycolytic phase now enters energy conserving phase.

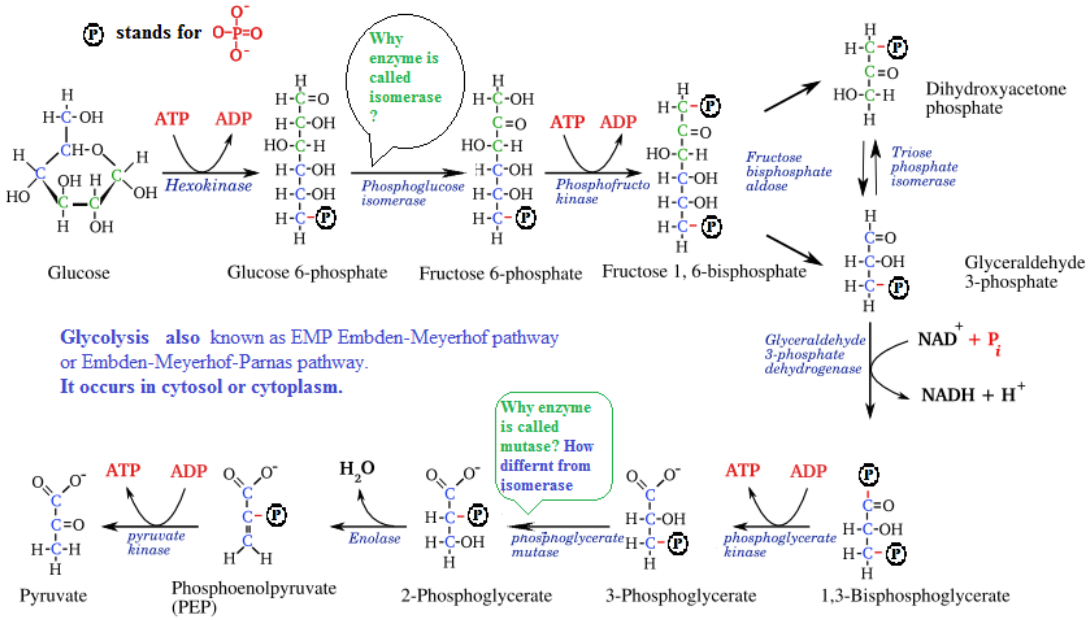
(vi) Dehydrogenation. Glyceraldehyde 3-P is dehydrogenated with NAD+ and H_3PO_4 (enzyme glyceraldehyde phosphate dehydrogenase) to form 1,3 - diphosphoglyceric acid. NADH is released.

(vii) Substrate Level ATP Synthesis. 1,3-diphosphoglyceric acid is dephosphorylated (by phosphoglycerate kinase and Mg^{2+}) to 3-phosphoglyceric acid. ATP is produced.

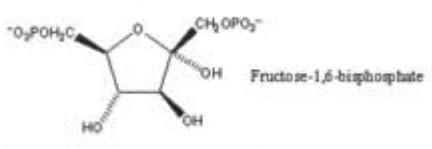
(viii) Isomerisation. 3-phosphoglyceric acid is changed to 2-phosphoglyceric acid (enzyme phosphoglyceromutase).

(ix) Dehydration. 2-phosphoglyceric acid loses a molecule of water and forms phosphoenolpyruvate or PEP (enzyme enolase and Mg^{2+}).

(x) Pyruvate and ATP Synthesis. Phosphoenol pyruvate is transformed to pyruvic acid (enzyme pyruvate kinase, Mg^{2+}, K^{+}). ATP is synthesised in the process. In glycolysis, a molecule of glucose is broken down to two molecules of pyruvic acid. In the process there is gain of 2 NADH and 2 ATP or equivalent to 8 ATP. Pyruvate is called pivotal metabolite. It takes part in different types of fermentation reactions under anaerobic conditions and forms acceptor molecule of Krebs cycle under aerobic conditions. Excess pyruvate can also undergo gluconeogenesis.



Gluconeogenesis- **Gluconeogenesis** is the metabolic process by which organisms produce sugars (namely glucose) for catabolic reactions from non-carbohydrate precursors. Glucose is the only energy source used by the brain (with the exception of ketone bodies during times of fasting), testes, erythrocytes, and kidney medulla.



1. Respiration(11-Ch14)11--Glycolysis-Steps
2. **Quiz- http://www.learnmyway.in/schoolBio.php**
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