

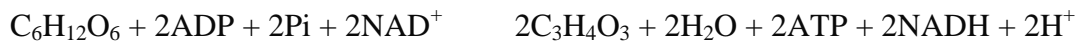
Ram Balak Mahto
Guest faculty
Zoology department
v.s.j college Rajnagar Madhubani
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GLYCOLYSIS

Glycolysis is the central pathway for the glucose catabolism in which glucose (6-carbon compound) is converted into pyruvate (3-carbon compound) through a sequence of 10 steps.

- Glycolysis takes place in both aerobic and anaerobic organisms and is the first step towards the metabolism of glucose.
- The glycolytic sequence of reactions differs from one species to the other in the mechanism of its regulation and the subsequent metabolic fate of the pyruvate formed at the end of the process.
- In aerobic organisms, glycolysis is the prelude to the citric acid cycle and the electron transport chain, which together release most of the energy contained in glucose.
- It is also referred to as Embden-Meyerhof-Parnas or EMP pathway, in honor of the pioneer workers in the field.

A summary of the process of glycolysis can be written as follows:



In words, the equation is written as:

Glucose + Adenosine diphosphate + Phosphate + Nicotinamide adenine dinucleotide

Pyruvate + Water + Adenosine triphosphate + Nicotinamide adenine dinucleotide +
Hydrogen ions

Glycolysis

In most kinds of cells, the enzymes that catalyze glycolytic reactions are present in the extra-mitochondrial fraction of the cell in the cytosol. One common characteristic in all the enzymes involved in glycolysis is that nearly all of them require Mg^{2+} . The following are the

enzymes that catalyze different steps throughout the process of glycolysis:

1. Hexokinase
2. Phosphoglucosomerase
3. Phosphofruktokinase
4. Aldolase
5. Phosphotriose isomerase
6. Glyceraldehyde 3-phosphate dehydrogenase
7. Phosphoglycerate kinase
8. Phosphoglycerate mutase
9. Enolase
10. Pyruvate kinase

- During glycolysis, a single mole of 6-carbon glucose is broken down into two moles of 3-carbon pyruvate by a sequence of 10 enzyme-catalyzed sequential reactions. These reactions are grouped under 2 phases, phase I and II.
- Stage I comprises “preparatory” reactions which are not redox reactions and do not release energy but instead lead to the production of a critical intermediate of the pathway.
- Stage I consists of the first five steps of the glycolysis process.
- Similarly, in Stage II, redox reactions occur, energy is conserved in the form of ATP, and two molecules of pyruvate are formed.
- The last five reactions of glycolysis constitute phase II.

