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## **STEPS IN GLYCOLYSIS PART-2**

Step 6- Oxidative Phosphorylation of Glyceraldehyde 3-phosphate



- Step 6 is one of the three energy-conserving or forming steps of glycolysis.
- The glyceraldehyde 3-phosphate is converted into 1,3-bisphosphoglycerate by the enzyme glyceraldehyde 3-phosphate dehydrogenase (phosphoglyceraldehyde dehydrogenase).
- In this process, NAD<sup>+</sup> is reduced to coenzyme NADH by the H<sup>-</sup> from glyceraldehydes 3-phosphate.
- Since two moles of glyceraldehyde 3-phosphate are formed from one mole of glucose, two NADH are generated in this step

Step 7- Transfer of phosphate from 1, 3-diphosphoglycerate to ADP



- This step is the ATP-generating step of glycolysis.
- It involves the transfer of phosphate group from the 1, 3-bisphosphoglycerate to ADP by the enzyme phosphoglycerate kinase, thus producing ATP and 3-phosphoglycerate.

• Since two moles of 1, 3-bisphosphoglycerate are formed from one mole of glucose, two ATPs are generated in this step.

Step 8- Isomerization of 3-phosphoglycerate



- The 3-phosphoglycerate is converted into 2-phosphoglycerate due to the shift of phosphoryl group from C3 to C2, by the enzyme phosphoglycerate mutase.
- This is a reversible isomerization reaction.





- In this step, the 2-phosphoglycerate is dehydrated by the action of enolase (phosphopyruvate hydratase) to phosphoenolpyruvate.
- This is also an irreversible reaction where two moles of water are lost

Step 10- Transfer of phosphate from phosphoenolpyruvate



- This is the second energy-generating step of glycolysis.
- Phosphoenolpyruvate is converted into an enol form of pyruvate by the enzyme pyruvate kinase.
- The enol pyruvate, however, rearranges rapidly and non-enzymatically to yield the keto form of pyruvate (i.e. ketopyruvate). The keto form predominates at pH 7.0.
- The enzyme catalyzes the transfer of a phosphoryl group from phosphoenolpyruvate to ADP, thus forming ATP.

The overall process of glycolysis results in the following events:

- 1. Glucose is oxidized into pyruvate.
- 2.  $NAD^+$  is reduced to NADH.
- 3. ADP is phosphorylated into ATP.