

- $\text{C}_6\text{H}_{12}\text{O}_6 \rightarrow 2 \text{C}_3\text{H}_4\text{O}_3 + 2 \text{H}_2\text{O}$, 2. $\text{C}_3\text{H}_4\text{O}_3 \rightarrow \text{C}_2\text{H}_2\text{O}_2 + \text{C}_1\text{H}_2\text{O}$, 3. $\text{C}_2\text{H}_2\text{O}_2 \rightarrow \text{C}_1\text{H}_2\text{O} + \text{C}_1\text{H}_2\text{O}$, 4. $\text{C}_1\text{H}_2\text{O} \rightarrow \text{C}_1\text{H}_2\text{O}$

2. Glycolysis -

- Glycolysis is the first stage of cellular respiration, occurring in the cytoplasm of the cell. It involves the breakdown of glucose into pyruvate. The process is divided into two main phases: the preparatory phase and the payoff phase. In the preparatory phase, glucose is converted into glyceraldehyde-3-phosphate (GAP). This step is irreversible and is catalyzed by the enzyme hexokinase. The reaction is: $\text{C}_6\text{H}_{12}\text{O}_6 + \text{H}_2\text{O} + \text{ATP} \rightarrow \text{C}_6\text{H}_{12}\text{O}_7 + \text{ADP}$. In the payoff phase, GAP is converted into pyruvate. This phase is reversible and involves several steps. The first step is the conversion of GAP into dihydroxyacetone phosphate (DHAP), which is then converted into phosphoenolpyruvate (PEP). The final step is the conversion of PEP into pyruvate, which is catalyzed by the enzyme pyruvate kinase. The reaction is: $\text{C}_3\text{H}_4\text{O}_3 + \text{H}_2\text{O} + \text{ATP} \rightarrow \text{C}_3\text{H}_4\text{O}_4 + \text{ADP}$. The overall reaction for glycolysis is: $\text{C}_6\text{H}_{12}\text{O}_6 + \text{H}_2\text{O} + 2 \text{ATP} \rightarrow 2 \text{C}_3\text{H}_4\text{O}_4 + 2 \text{ADP}$.

3. Citric Acid Cycle -

- The Citric Acid Cycle (CAC) is the second stage of cellular respiration, occurring in the mitochondria. It involves the breakdown of pyruvate into carbon dioxide and water. The cycle is a series of reactions that release energy in the form of ATP and NADH. The first step is the conversion of pyruvate into acetyl-CoA, which is catalyzed by the enzyme pyruvate dehydrogenase. The reaction is: $\text{C}_3\text{H}_4\text{O}_4 + \text{H}_2\text{O} + \text{NAD}^+ \rightarrow \text{C}_2\text{H}_3\text{O}_2 + \text{CO}_2 + \text{NADH}$. The acetyl-CoA then enters the cycle, where it is converted into citrate. Citrate is then converted into isocitrate, which is then converted into α -ketoglutarate. α -ketoglutarate is then converted into succinyl-CoA, which is then converted into succinate. Succinate is then converted into malate, which is then converted into oxaloacetate. Oxaloacetate then combines with acetyl-CoA to form citrate, completing the cycle. The overall reaction for the CAC is: $\text{C}_2\text{H}_3\text{O}_2 + 3 \text{H}_2\text{O} + 4 \text{NAD}^+ + 2 \text{FAD} + 2 \text{ADP} + 2 \text{H}^+ \rightarrow 2 \text{CO}_2 + 4 \text{NADH} + 2 \text{FADH}_2 + 2 \text{ATP} + 2 \text{H}^+$.

4. Electron Transport Chain -

1. Glycolysis -

- Glycolysis is the first stage of cellular respiration, occurring in the cytoplasm of the cell. It involves the breakdown of glucose into pyruvate. The process is divided into two main phases: the preparatory phase and the payoff phase. In the preparatory phase, glucose is converted into glyceraldehyde-3-phosphate (GAP). This step is irreversible and is catalyzed by the enzyme hexokinase. The reaction is: $\text{C}_6\text{H}_{12}\text{O}_6 + \text{H}_2\text{O} + \text{ATP} \rightarrow \text{C}_6\text{H}_{12}\text{O}_7 + \text{ADP}$. In the payoff phase, GAP is converted into pyruvate. This phase is reversible and involves several steps. The first step is the conversion of GAP into dihydroxyacetone phosphate (DHAP), which is then converted into phosphoenolpyruvate (PEP). The final step is the conversion of PEP into pyruvate, which is catalyzed by the enzyme pyruvate kinase. The reaction is: $\text{C}_3\text{H}_4\text{O}_3 + \text{H}_2\text{O} + \text{ATP} \rightarrow \text{C}_3\text{H}_4\text{O}_4 + \text{ADP}$. The overall reaction for glycolysis is: $\text{C}_6\text{H}_{12}\text{O}_6 + \text{H}_2\text{O} + 2 \text{ATP} \rightarrow 2 \text{C}_3\text{H}_4\text{O}_4 + 2 \text{ADP}$.

Date

2024/12/22

Date Created

2024/07/19

Author

firstcareer-in