

4 5 cellular respiration in detail study

answer key

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4.5 Cellular Respiration in Detail

Question 1: What is cellular respiration and where does it take place?

Answer: Cellular respiration is a complex biochemical process that converts glucose into energy in the form of ATP (adenosine triphosphate). It occurs in two main stages: glycolysis in the cytoplasm and the Krebs cycle (citric acid cycle) and electron transport chain in the mitochondria.

Question 2: Describe the steps involved in glycolysis.

Answer: Glycolysis is the first stage of cellular respiration, taking place in the cytoplasm. It breaks down glucose into two pyruvate molecules, along with a net gain of 2 ATP and 2 NADH (nicotinamide adenine dinucleotide) molecules.

Question 3: Explain the Krebs cycle.

Answer: The Krebs cycle is the second stage of cellular respiration, occurring in the mitochondria. It involves a series of reactions that further break down pyruvate into carbon dioxide, releasing energy in the form of NADH, FADH₂ (flavin adenine dinucleotide), and ATP.

Question 4: Describe the electron transport chain and oxidative phosphorylation.

Answer: The electron transport chain is a series of protein complexes located in the inner mitochondrial membrane. It receives electrons from NADH and FADH₂ and transfers them through a series of carriers, ultimately reducing oxygen and forming

water. The energy released during this process is used to pump protons across the membrane, establishing a proton gradient. This gradient powers ATP synthase, an enzyme that synthesizes ATP from ADP (adenosine diphosphate) and inorganic phosphate.

Question 5: What is the overall energy yield of cellular respiration?

Answer: For every molecule of glucose oxidized through cellular respiration, the net energy yield is approximately 36-38 ATP molecules. This energy is used to power various cellular processes essential for life.

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