Glycolysis Quiz Answer Key PDF

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Explain the significance of glycolysis in cellular metabolism.

Glycolysis is significant in cellular metabolism as it breaks down glucose to produce pyruvate, ATP, and NADH, which are vital for energy production and further metabolic processes.

Describe the energy investment phase of glycolysis and its importance.

The energy investment phase of glycolysis is crucial as it uses 2 ATP to phosphorylate glucose, making it more reactive and allowing it to be split into two three-carbon molecules, which is essential for the subsequent steps of glycolysis.

Which of the following are true about glycolysis? (Select all that apply)

A. It is an anaerobic process. ✓

C. It occurs in the mitochondria.

D. It produces NADH. ✓

C. It is the first step in cellular respiration. ✓

How is glycolysis regulated by feedback inhibition? Provide examples of molecules involved.

Glycolysis is regulated by feedback inhibition, particularly by phosphofructokinase, which is inhibited by high levels of ATP and citrate, ensuring that glycolysis slows down when energy levels are sufficient.

Compare and contrast glycolysis under aerobic and anaerobic conditions.

Glycolysis occurs in both aerobic and anaerobic conditions; under aerobic conditions, it leads to the Krebs cycle, while under anaerobic conditions, it results in fermentation, producing lactate or ethanol, which allows for ATP production without oxygen.

Discuss the role of phosphofructokinase in glycolysis and how it is regulated.

Phosphofructokinase plays a crucial role in regulating glycolysis by controlling its rate; it is inhibited by ATP and activated by AMP, allowing the cell to adjust glycolysis based on energy needs.

Which enzyme catalyzes the first step of glycolysis?

A. Phosphofructokinase
C. Pyruvate kinase
D. Aldolase
C. Hexokinase ✓

In which conditions does glycolysis occur? (Select all that apply)

A. Aerobic ✓
C. Anaerobic ✓
D. High oxygen
C. Low oxygen ✓

Glycolysis is an example of which type of metabolic pathway?

A. Anabolic
C. Amphibolic
D. Reductive
C. Catabolic ✓

Which enzymes are involved in the regulation of glycolysis? (Select all that apply)

A. Hexokinase ✓
C. Phosphofructokinase ✓
D. Glucose-6-phosphatase
C. Pyruvate kinase ✓

Which of the following is a key regulatory enzyme in glycolysis?

A. Lactate dehydrogenase
C. Citrate synthase

D. ATP synthase

C. Phosphofructokinase ✓

Explain how glycolysis can continue in the absence of oxygen and the implications for muscle cells during intense exercise.

Glycolysis can continue without oxygen through fermentation, which converts pyruvate to lactate, regenerating NAD+ and allowing ATP production. This is vital for muscle cells during intense exercise when oxygen is scarce, but it can lead to lactate buildup and fatigue.

Which of the following steps in glycolysis involve substrate-level phosphorylation? (Select all that apply)

A. Conversion of glucose to glucose-6-phosphate

C. Conversion of 1,3-bisphosphoglycerate to 3-phosphoglycerate ✓

D. Conversion of fructose-6-phosphate to fructose-1,6-bisphosphate

C. Conversion of phosphoenolpyruvate to pyruvate ✓

Which molecule is the final product of glycolysis?

A. Acetyl-CoA

C. Lactate

D. Ethanol

C. Pyruvate ✓

Where in the cell does glycolysis occur?

A. Nucleus

C. Cytoplasm ✓

D. Endoplasmic reticulum

C. mitochondria

Which of the following is NOT a product of glycolysis?

A. NADH

C. ATP

D. Pyruvate

C. CO2 ✓

What is the net gain of ATP molecules per glucose molecule in glycolysis?

A. 1 ATP
C. 4 ATP
D. 6 ATP
C. 2 ATP ✓

Which molecules can inhibit the glycolytic pathway? (Select all that apply)

A. ATP ✓
C. ADP
D. AMP
C. Citrate ✓

Which of the following are products of glycolysis? (Select all that apply)

A. ATP ✓
C. FADH2
D. Pyruvate ✓
C. NADH ✓

What is the primary function of glycolysis?

A. To convert glucose into carbon dioxide
C. To convert glucose into pyruvate ✓
D. To generate oxygen
C. To produce glucose from pyruvate