What is Glycolysis?

Worksheet

Glycolysis converts one glucose (C6H12O6) into two pyruvate molecules, netting 2 ATP and 2 NADH; without oxygen, fermentation recycles NADH back to NAD+ via lactic acid or alcoholic pathways.

Questions

1. Glycolysis splits one glucose molecule into:

A) One lactate molecule
B) Two pyruvate molecules
C) Six CO2 molecules
D) One acetyl-CoA molecule

2. What is the net ATP yield of glycolysis?

A) 0 ATP
B) 2 ATP
C) 4 ATP
D) 36 ATP

3. Why does fermentation occur when oxygen is absent?

A) To produce more ATP
B) To regenerate NAD+ for glycolysis to continue
C) To make more oxygen
D) To stop glycolysis

4. Which fermentation pathway produces ethanol and CO2?

A) Lactic acid fermentation
B) Alcoholic fermentation
C) Oxidative phosphorylation
D) Krebs cycle

5. A cell processes 5 glucose molecules through glycolysis. How much net ATP is produced?

6. Glycolysis invests 2 ATP and produces 4 ATP in the payoff phase for one glucose. What is the net gain?

7. A muscle cell ferments 8 pyruvate molecules to lactate during sprinting (1 NADH oxidized per pyruvate reduced). How many NAD+ are regenerated?

8. Define: What does glycolysis convert glucose into?

9. Define: Does glycolysis need oxygen?

10. Define: Why is fermentation necessary without oxygen?

Answer Key

1. B) Two pyruvate molecules - Glycolysis cleaves glucose into two 3-carbon pyruvate molecules.
2. B) 2 ATP - 4 ATP are produced but 2 are invested, netting 2 ATP.
3. B) To regenerate NAD+ for glycolysis to continue - Without oxygen, the electron transport chain stalls, so fermentation regenerates NAD+ instead.
4. B) Alcoholic fermentation - Alcoholic fermentation, used by yeast, converts pyruvate to ethanol and CO2.
5. Net ATP per glucose = 2 Total = 5 2 = 10 ATP
6. Net ATP = produced invested Net ATP = 4 2 = 2 ATP
7. NAD+ regenerated = number of pyruvate molecules reduced NAD+ regenerated = 8
8. Two molecules of pyruvate, plus a net gain of 2 ATP and 2 NADH.
9. No - it occurs in the cytoplasm and works with or without oxygen.
10. It regenerates NAD+ from NADH so glycolysis can keep running.