What is Glycolysis?

Worksheet

Glycolysis splits one 6-carbon glucose molecule into two 3-carbon pyruvate molecules, producing a net gain of 2 ATP and 2 NADH per glucose, without requiring oxygen.

C_6H_{12}O_6 @rightarrow 2 C_3H_6O_3 + 2 ATP + 2 NADH

Questions

1. What is the net ATP yield of glycolysis per glucose molecule?

A) 4 ATP
B) 2 ATP
C) 6 ATP
D) 0 ATP

2. Where in the cell does glycolysis take place?

A) Mitochondrial matrix
B) Cytoplasm
C) Nucleus
D) Inner mitochondrial membrane

3. How many pyruvate molecules result from one glucose molecule?

A) 1
B) 2
C) 3
D) 4

4. Does glycolysis require oxygen to proceed?

A) Yes, always
B) No, it can occur without oxygen
C) Only in plants
D) Only in muscle cells

5. One glucose molecule enters glycolysis. How many ATP are invested and how many are produced in the payoff phase?

6. If a cell processes 5 glucose molecules through glycolysis, how much net ATP and NADH result?

7. How many pyruvate molecules are produced from 3 glucose molecules?

8. Define: What is glycolysis?

9. Define: Does glycolysis need oxygen?

10. Define: How many ATP are invested vs produced?

Answer Key

1. B) 2 ATP - 4 ATP are produced but 2 are invested, giving a net of 2 ATP.

2. B) Cytoplasm - Glycolysis occurs in the cytoplasm, outside the mitochondria.

3. B) 2 - The 6-carbon glucose splits into two 3-carbon pyruvate molecules.

4. B) No, it can occur without oxygen - Glycolysis is anaerobic; oxygen is only needed for later stages of aerobic respiration.

5. Investment phase uses 2 ATP to phosphorylate glucose Payoff phase produces 4 ATP (2 ATP per G3P 2 G3P) Net ATP = 4 2 = 2 ATP

6. Net ATP per glucose = 2 Net ATP for 5 glucose = 5 2 = 10 ATP NADH per glucose = 2, so NADH for 5 glucose = 5 2 = 10 NADH

7. Each glucose yields 2 pyruvate For 3 glucose: 3 2 = 6 pyruvate molecules

8. The pathway that splits one glucose molecule into two pyruvate molecules in the cytoplasm, yielding a net 2 ATP and 2 NADH.

9. No - it is anaerobic and occurs in nearly all living cells.

10. 2 ATP are invested; 4 ATP are produced, for a net gain of 2 ATP.