

## Chap 8 Sample Questions

At the end of glycolysis, the original carbons of the glucose molecule form:

- a. six molecules of carbon dioxide.
- b. two molecules of NADH.
- c. two molecules of pyruvic acid.
- d. two molecules of citric acid.
- e. two molecules of fructose.

The anaerobic breakdown of glucose is called:

- a. Fermentation
- b. Respiration
- c. Phosphorylation
- d. Chemosmosis
- e. Glycoysis

What results if glucose is metabolized under completely anaerobic conditions?

- a. Pyruvic acid immediately enters the Krebs cycle.
- b. Pyruvic acid is converted by fermentation into CO<sub>2</sub> and ethanol or lactic acid.
- c. Pyruvic acid is converted back to fructose until the concentration of oxygen increases.
- d. Pyruvic acid leaves the cytosol and enters the mitochondrial matrix.
- e. Pyruvic acid is converted to NADH.

During glycolysis, what is the net gain of ATP molecules produced?

- a. 2
- b. 4
- c. 34
- d. 36
- e. 38

Which event occurs in the cytosol of a cell undergoing glucose metabolism?

- a. Krebs (citric acid) cycle
- b. Electron transport
- c. chemiosmosis
- d. Acetyl-CoA formation
- e. Glycolysis

Where does fermentation occur within a cell undergoing anaerobic metabolism of glucose?

- a. Surface of cell membrane
- b. Stroma of chloroplast
- c. Mitochondrial matrix
- d. Cytosol
- e. Nucleus

You are playing a long tennis match and your muscles begin to switch to anaerobic respiration. Which of the following is NOT a bad consequence?

- a. Your cells convert NADH to NAD<sup>+</sup>.
- b. Lactic acid is produced.
- c. ATP production declines.
- d. Oxygen debt increases.
- e. All of these ARE problems.

After fermentation, lactic acid is converted to pyruvic acid in the...

- a. Blood stream
- b. Liver
- c. Muscles
- d. Heart
- e. Lungs

What is the significance of the conversion of pyruvic acid to lactic acid during fermentation?

- a. Pyruvic acid becomes available to enter matrix reactions.
- b. The citric acid cycle is initiated.
- c. NAD<sup>+</sup> is regenerated for use in glycolysis.
- d. The oxidation of pyruvic acid becomes possible.
- e. ATP is produced.

In vertebrate animal cells, where does the synthesis of lactic acid occur?

- a. Cytosol
- b. Surface of ribosomes
- c. Mitochondrial matrix
- d. Mitochondrial inner membranes
- e. Nucleus

How does one account for the bubbles that "tickle your nose" when one drinks a glass of champagne?

- a. Bubbles of CO<sub>2</sub> are trapped due to the chemistry of aerobic respiration by yeast cells.
- b. Lactic acid fermentation accounts for the bubbles in a bottle of sparkling wine such as champagne.
- c. The champagne was bottled while the yeast were still alive and fermenting, so bubbles of CO<sub>2</sub> were trapped.
- d. The bubbles are simply air bubbles which resulted from the wine-making process.
- e. The bubbles were formed by the yeast cells during glycolysis.

Strenuous exercise increases CO<sub>2</sub> production. Specifically, where is the CO<sub>2</sub> coming from?

- a. glycolysis
- b. C<sub>3</sub> cycle
- c. Krebs cycle
- d. chemiosmosis
- e. fermentation

How do fatigued human muscle cells repay an "oxygen debt"?

- a. Cells produce more oxygen.
- b. The cells convert glucose into pyruvic acid.
- c. The tired cells increase production of ATP.
- d. The cells decrease CO<sub>2</sub> production.
- e. Lactic acid is converted back into pyruvic acid by the cells.

Which of the following statements is true of glycolysis followed by fermentation?

- a. It produces a net gain of ATP.
- b. It produces a net gain of NADH.
- c. It is an aerobic process.
- d. It can be performed only by bacteria.
- e. It produces more ATP than aerobic respiration.

Which kind of metabolic poison would interfere with glycolysis?

- a. An agent that reacts with oxygen and depletes its concentration in the cell.
- b. An agent that binds to pyruvate and inactivates it.
- c. An agent that closely mimics the structure of glucose, but is not capable of being metabolized.
- d. An agent that reacts with NADH and oxidizes it to NAD<sup>+</sup>.
- e. An agent that inhibits the formation of acetyl coenzyme A.

Briefly compare and contrast the processes of cellular respiration and photosynthesis.

How does the lack of oxygen influence energy availability in animals?

Most of the energy produced by the breakdown of glucose is released as \_\_\_\_\_ and the remaining energy is converted to \_\_\_\_\_.

The organelles responsible for the bulk of ATP production in cellular respiration are the \_\_\_\_\_.

How does Baker's yeast in bread dough make the bread rise?

Why is it important to regenerate  $\text{NAD}^+$  molecules during fermentation?

\_\_\_\_\_ is the only state in glucose metabolism that does not require oxygen to proceed.

Two possible end products of fermentation are \_\_\_\_\_ as is produced by our muscle cell under anaerobic conditions and \_\_\_\_\_ by yeast under anaerobic conditions.

The conversion of glucose to lactic acid is a form of \_\_\_\_\_.

Yeast in a bottle of champagne produce \_\_\_\_\_ and \_\_\_\_\_.

ATP is

- a short-term, energy-storage compound.
- the cell's principle compound for energy transfers.
- synthesized within mitochondria.
- the molecule all living cell rely on to do work.
- all of the above.

The end product of glycolysis is

- pyruvate.
- the starting point for the citric acid cycle.
- the starting point for the fermentation pathway.
- a and b.
- a, b and c.

In the first reaction of glycolysis, glucose receives a phosphate group from ATP. This reaction is

- a. respiration.
- b. fermentation.
- c. exergonic.
- d. endergonic.
- e. none of the above.

For bacteria to continue growing rapidly when they are shifted from an environment containing oxygen to an anaerobic environment, they must

- a. increase the rate of the citric acid cycle.
- b. produce more ATP per mole of glucose during glycolysis.
- c. produce ATP using NADH.
- d. increase the rate of transport of electrons down the respiratory chain.
- e. increase the rate of glycolytic reactions.

During the fermentation of one molecule of glucose, the net production of ATP is

- a. one molecule.
- b. two molecules.
- c. three molecules.
- d. six molecules.
- e. eight molecules.

In human cells (muscle cells) the fermentation process produces

- a. lactic acid.
- b. 12 molecules of ATP.
- c. pyruvic acid.
- d. an excessive amount of energy.
- e. none of the above.

Products of the fermentation process can include

- a. carbon dioxide
- b. ethanol
- c. lactic acid
- d. all of the above
- e. none of the above

During which part of aerobic respiration is the oxygen actually used?

- a. Glycolysis
- b. Fermentation
- c. Krebs cycle
- d. Conversion of pyruvic acid to acetyl CoA
- e. Electron transport system

Why do you breathe more heavily during exercise?

- a. because your cells need more O<sub>2</sub>
- b. because your cells are producing more CO<sub>2</sub>
- c. because your cells need more glucose
- d. a and b
- e. all of the above

The metabolic breakdown of one molecule of glucose harvests the greatest amount of energy during:

- a. Glycolysis
- b. Krebs cycle
- c. Matrix reactions
- d. Fermentation
- e. Electron transport

Each turn of the Krebs cycle (including the preparatory step) produces \_\_\_\_\_ CO<sub>2</sub> molecules.

- a. 1
- b. 2
- c. 3
- d. 4
- e. 5

Where does the synthesis of pyruvic acid occur during glycolysis?

- a. Cristae
- b. Ribosomes
- c. Matrix
- d. Intermembrane compartment
- e. Cytosol

Which of the following is an example of an electron carrier molecule?

- a. Citric acid
- b. CO<sub>2</sub>
- c. Acetyl CoA
- d. NADH
- e. ATP

The electron transport chain receives electrons directly from:

- a. NADH
- b. FADH<sub>2</sub>
- c. ATP
- d. a and b
- e. All of these

In the matrix reactions, what happens to the original carbons in pyruvic acid?

- a. They form the backbone chain of citric acid.
- b. They form the ring structure of oxaloacetic acid.
- c. They are incorporated into molecules of NADH and FADH<sub>2</sub>.
- d. They end up in molecules of CO<sub>2</sub>.
- e. They form glucose.

Chemiosmosis in mitochondria directly results in the synthesis of:

- a. NADH
- b. FADH<sub>2</sub>
- c. H<sub>2</sub>O
- d. CoA
- e. ATP

What is the final electron acceptor in cellular respiration?

- a. ATP
- b. NADH
- c. Carbon dioxide
- d. Oxygen
- e. FADH<sub>2</sub>

In the matrix, oxygen combines with \_\_\_\_\_ to form \_\_\_\_\_.

- a. electrons; water
- b. hydrogen ions; water
- c. electrons and hydrogen ions; water
- d. carbon; CO<sub>2</sub>
- e. electrons and carbon; CO<sub>2</sub>

The cells of which of these organs undergo aerobic respiration?

- a. heart
- b. lungs
- c. skin
- d. kidneys
- e. all of these

Oxygen is necessary for cellular respiration because oxygen:

- a. Combines with electrons and hydrogen ions to form water
- b. Combines with carbon to form carbon dioxide
- c. Combines with carbon dioxide and water to form glucose
- d. Reduces glucose to form carbon dioxide and water
- e. Combines with electrons to form CO<sub>2</sub>

When oxygen is present:

- a. Most cells utilize aerobic cellular respiration
- b. Most animal cells will carry on fermentation and produce lactic acid
- c. Most bacteria and yeasts carry on fermentation
- d. Two ATP molecules are produced for each glucose molecule
- e. Most animals will convert CO<sub>2</sub> to glucose

ATP can be used to drive nonspontaneous reactions because

- a. nonspontaneous reactions are exergonic.
- b. the breakdown of ATP to ADP is exergonic.
- c. the breakdown of ATP to ADP is endergonic.
- d. when ATP is broken down to ADP, phosphate is released.
- e. ADP possesses more free energy than ATP.

The portion of aerobic respiration that produces the most ATP per molecule of glucose is

- a. chemiosmosis.
- b. the citric acid cycle.
- c. glycolysis.
- d. lactic acid fermentation.
- e. alcohol fermentation.

In yeast, if the electron transport system is shut down because of a lack of oxygen, glycolysis will probably

- a. shut down.
- b. increase.
- c. produce more ATP per molecule of glucose.
- d. produce more NADH per molecule of glucose.
- e. produce more acetyl coenzyme A.

As a biker pumps up a hill to the finish line of a race, his leg muscles are most likely

- a. using cellular respiration to produce maximal ATP levels.
- b. using more oxygen for maximal ATP production.
- c. using lactic acid fermentation for ATP production.
- d. both a and b.
- e. all of the above.

Which parts of the mitochondria are directly involved in the synthesis of ATP during chemiosmosis?

- a. matrix
- b. inner mitochondrial membrane
- c. outer mitochondrial membrane
- d. a and b
- e. a, b and c

Which of the following most closely matches the correct order of main events of cellular respiration?

- a. glycolysis, pyruvate enters mitochondrion, Krebs cycle, major ATP production, electron transport
- b. glycolysis, major ATP production, pyruvate enters mitochondrion, electron transport, Krebs cycle
- c. glycolysis, Krebs cycle, electrons transport system, major ATP production
- d. Krebs cycle, electron transport, major ATP production, glycolysis
- e. major ATP production, pyruvate enters mitochondrion, Krebs cycle, electron transport

The major products of the Krebs cycle includes

- a. ATP
- b. carbon dioxide
- c. energy carriers
- d. b and e only
- e. all of the above

Under normal aerobic conditions, which of the following increases in the human body?

- a. ATP
- b. CO<sub>2</sub>
- c. Water
- d. a and b
- e. All of the above

The part of a mitochondrion that structurally compares to the stroma of a chloroplast is the:

- a. Grana
- b. Matrix
- c. Thylakoids
- d. Cristae
- e. Outer membrane

The cristae of the mitochondria can be compared functionally to the thylakoid membranes of the chloroplast because both contain a system for:

- a. Enzyme synthesis
- b. Pyruvate production
- c. Glucose synthesis
- d. Anaerobic respiration
- e. Electron transport