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Level: HL IB in Biology

Subject: Biology

Topic: IB HL Biology

Type: Topic Question

2002

XVIII

1583

All International Baccalaureate IB Topic Questions HL Biology

BIOLOGY

HL - IB

Key skills

****Question 1****

Which of the following statements are correct?

- I. Cellular respiration is also called ventilation.
- II. Cellular respiration is a series of chemical reactions that releases energy that is stored within the bonds of nutrient molecules.
- III. Cellular respiration is an anabolic process.
- IV. Cellular respiration produces ATP.

- A. I, II, and IV
- B. III and IV
- C. II and IV
- D. IV

[1 mark]

****Question 2****

What happens when ATP is converted to ADP?

- A. A net release of energy.
- B. A net amount of energy is destroyed.
- C. It can never be reconverted to ATP.
- D. A phosphate is added.

[1 mark]



****Question 3****

Which of the following correctly describe anaerobic respiration in yeast vs. mammalian cells?

	Anaerobic respiration in mammalian cells	Anaerobic respiration in yeast cells
A	Only occurs in absence of oxygen.	Carbon dioxide bubbles cause bread dough to rise.
B	Fewer molecules of ATP per glucose are produced compared to aerobic respiration.	Wine, beer, and other alcohols including biofuels use anaerobic respiration of yeast cells.
C	Build up of carbon dioxide causes muscle fatigue and cramps.	Does not produce ATP molecules.
D	More ATP is produced than in aerobic respiration	Lactate is produced and collected as biofuel.

[1 mark]

****Question 4****

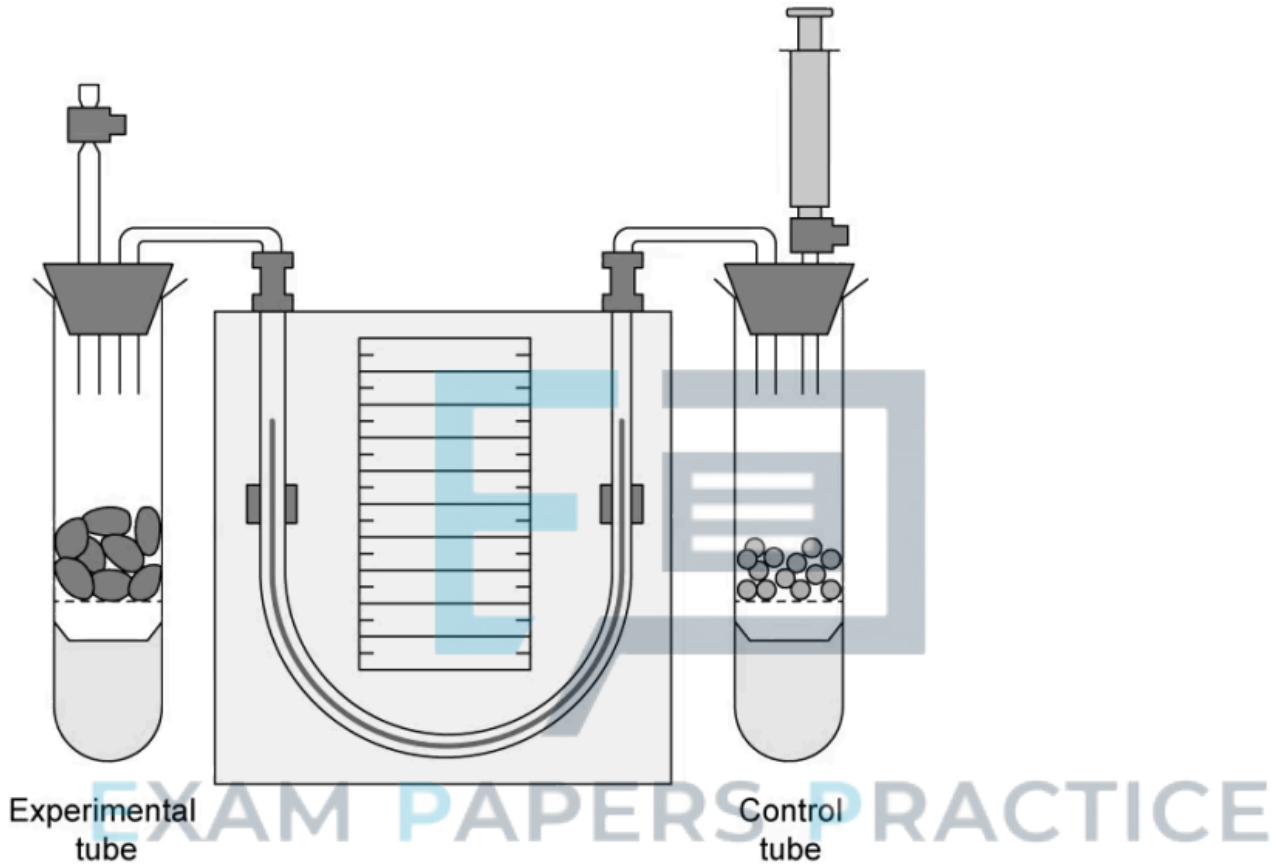
Which of the following is not considered an advantage of anaerobic respiration?

- A. ATP is still produced even in low or no oxygen environments.
- B. Anaerobic respiration allows for short, quick bursts of energy.
- C. Lactate builds up in muscle fibres in humans.
- D. Yeast releases carbon dioxide bubbles in baking.

[1 mark]

****Question 5****

The diagram below shows a respirometer used to measure the respiration rate of germinating bean seeds.



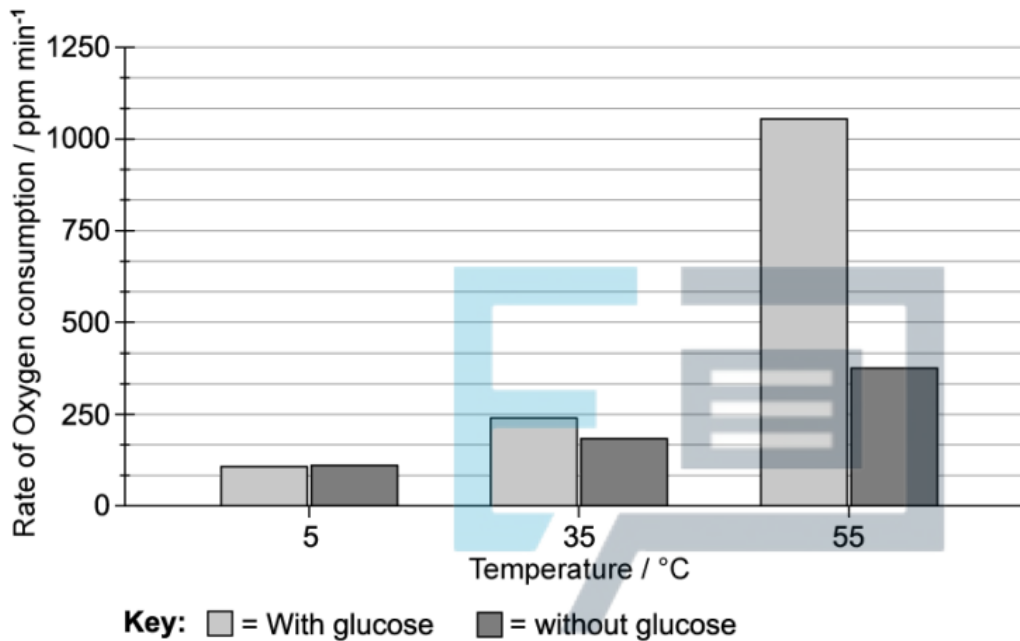
What direction will the manometer fluid move and what is the role of the liquid placed in the bottom of each tube?

	Direction of movement of the manometer fluid	Role of liquid at the bottom of the tubes
A	Up the left side	To release energy
B	Down the right side	To absorb carbon dioxide
C	Down the left side	It is the independent variable
D	Down the right side	To react with the oxygen produced

[1 mark]

****Question 6****

The rate of oxygen consumption was compared in yeast cells incubated with and without glucose at three different temperatures under aerobic conditions. The yeast cells were incubated for a period of 3 minutes during which the rate of O₂ consumption was measured with an O₂ sensor.



What can be concluded from the results of this experiment?

- A. Glucose affects the rate of oxygen consumption at higher temperatures less than it does at lower temperatures.
- B. Rate of cell respiration increases with temperature.
- C. Glucose is broken down faster at 55°C.
- D. Yeast does not break down glucose at lower temperatures.

[1 mark]

****Question 7****

Which of the following is not an ethical consideration you should take when working on experiments that use a respirometer to measure respiration rate?

- A. All hazards should be minimized. The animal should not suffer pain, be harmed, or be put at risk in any way.
- B. Animals should be returned to their natural habitat as soon as data is collected.
- C. If an alternative method exists that uses animals instead of plants, it should be used as it provides more accurate data.
- D. It is important to carefully weigh the benefit of learning with the potential harm and choose the most appropriate and ethical method.

[1 mark]

****Question 8****

Which of the following require ATP?

- I. Making DNA, RNA and proteins.
- II. Active transport of ions across membranes.
- III. Osmosis.
- IV. Muscle contractions.

- A. I, II, and IV
- B. III and IV
- C. II and IV
- D. IV

[1 mark]

****Question 9****

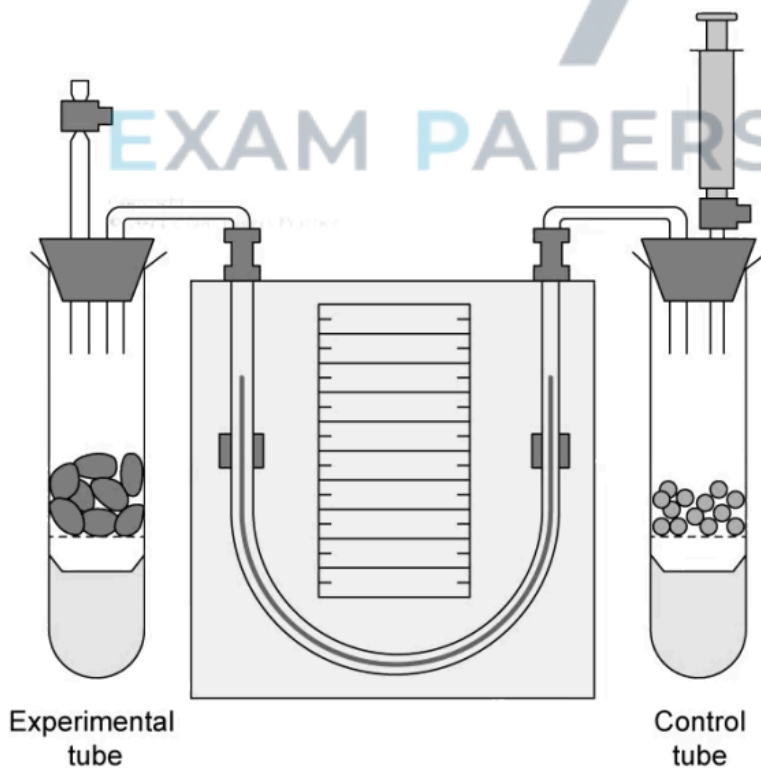
Which of the following statements correctly describe aerobic and anaerobic cell respiration in some organisms?

	Aerobic cell respiration	Anaerobic cell respiration
A	Products are carbon dioxide and water	Does not produce ATP
B	Much higher number of ATP molecules produced	Completely oxidizes glucose
C	Lipids and proteins can also be used as substrates	Products are lactate and ATP
D	Occurs in the cytoplasm	Occurs in the mitochondria

[1 mark]

****Question 10****

The diagram shows a typical respirometer set-up.



What is the solution at the bottom of the tubes and what is its function?



	Solution	Function
A	Acid	To ensure equal volumes of air in both tubes.
B	Acid	To accurately measure the amount of carbon dioxide consumed.
C	Alkali	To protect the organism.
D	Alkali	To absorb carbon dioxide.

[1 mark]

****Question 11****

Which row best describes an oxidation reaction?

	Hydrogen	Oxygen	Electrons	Energy
A	Loss	Gain	Loss	Released
B	Gain	Gain	Loss	Absorbed
C	Gain	Loss	Loss	Released
D	Loss	Gain	Loss	Absorbed

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[1 mark]

****Question 12****

Which of the following best shows the reduction of NAD?

- A. $\text{NAD} + \text{H}_2 \rightarrow \text{NADH} + \text{H}^+$
- B. $\text{NAD}^+ + \text{e}^- + \text{H}^+ \rightarrow \text{NADH} + \text{H}$
- C. $\text{NAD} + 2\text{H} + 2\text{e}^- \rightarrow \text{NADH}$
- D. $\text{NAD}^+ + 2\text{e}^- + 2\text{H}^+ \rightarrow \text{NADH} + \text{H}^+$

[1 mark]

****Question 13****

Which statements correctly describe phosphorylation and dephosphorylation reactions?

- I. The phosphorylation of ADP is an endergonic reaction.
- II. The dephosphorylation of ATP is an endergonic reaction.
- III. The phosphorylation of ADP is a hydrolysis reaction.
- IV. The dephosphorylation of ATP is a hydrolysis reaction.

- A. I and II
- B. II and III
- C. I and IV
- D. II and IV

[1 mark]

****Question 14****

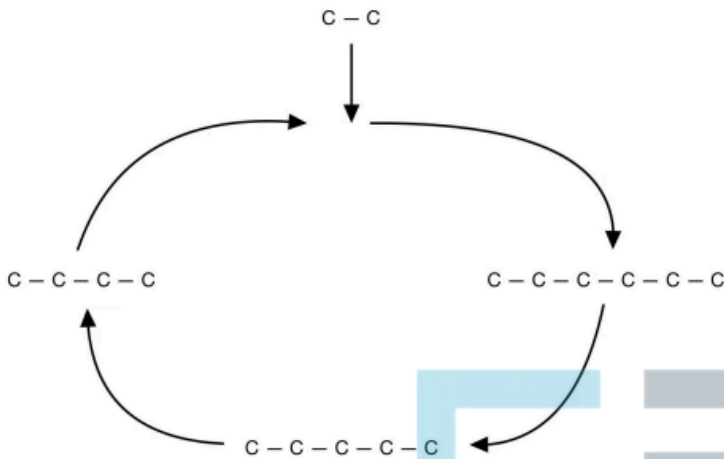
Which row shows the products of glycolysis?

	ATP	Pyruvate	Glucose	Reduced NAD
A	4	2	0	2
B	2	2	2	2
C	2	1	1	2
D	2	2	0	2

[1 mark]

****Question 15****

The diagram below shows a simplified Krebs cycle.



How many times does decarboxylation occur during the Krebs cycle?

- A. Once
- B. Twice
- C. Three times
- D. Four times

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****Question 16****

Which of the following is true of oxidative phosphorylation?

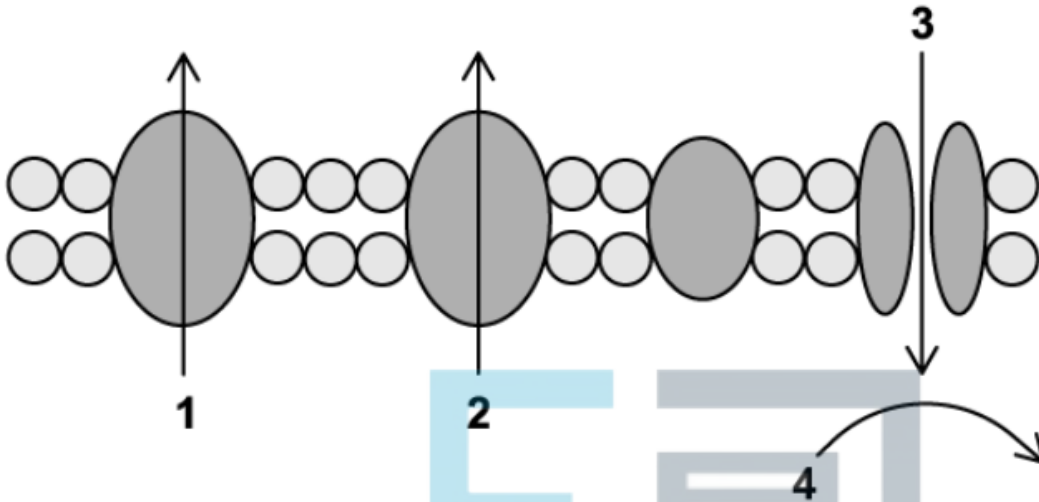
- I. It is the last stage of aerobic respiration.
- II. It takes place on the inner mitochondrial membrane.
- III. It involves chemiosmosis.
- IV. It involves the electron transport chain.

- A. I, II, and IV
- B. II and IV
- C. I, II, and III
- D. I, II, III, and IV

[1 mark]

****Question 17****

The diagram below represents a simplified version of the electron transport chain and chemiosmosis.



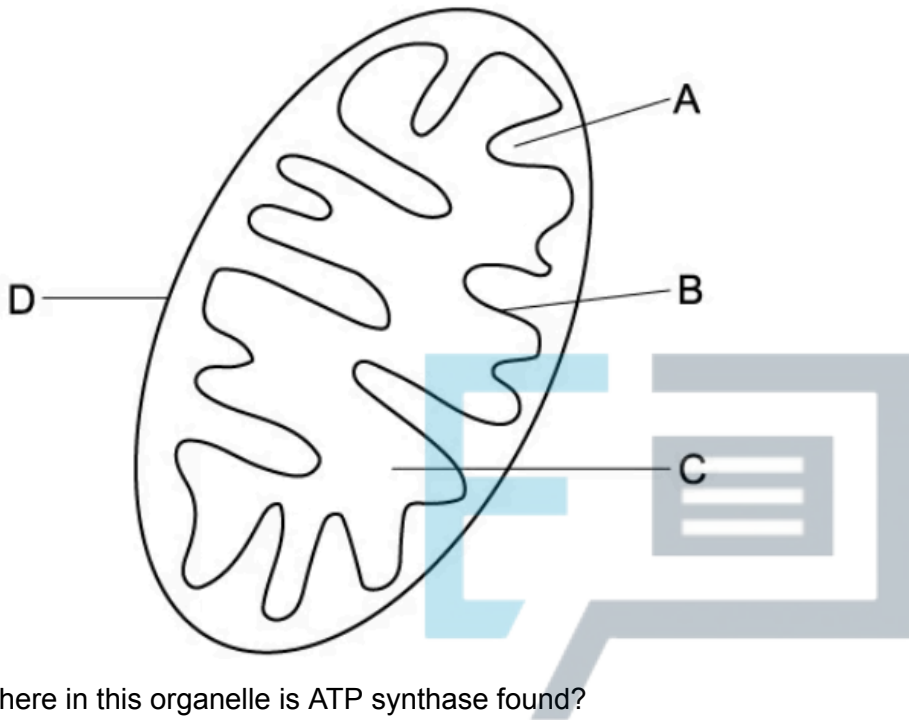
Which row correctly describes the events labelled 1-4 above?

	1	2	3	4
A	Protons move across the cristae into the intermembrane space	Protons move across the cristae into the intermembrane space	Protons are pumped through ATP synthase	ADP is phosphorylated
B	Protons move across the cristae into the matrix	Protons move across the cristae into the matrix	Protons are pumped through ATP synthase	ATP is phosphorylated
C	Protons move across the cristae into the intermembrane space	Protons move across the cristae into the intermembrane space	Protons diffuse through ATP synthase	ADP is phosphorylated
D	Protons move across the cristae into the intermembrane space	Protons move across the cristae into the intermembrane space	Protons diffuse through ATP synthase	ATP is phosphorylated

[1 mark]

****Question 18****

The diagram below shows a mitochondrion.



Where in this organelle is ATP synthase found?

[1 mark]

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****Question 19****

Which row correctly shows the features of a mitochondrion that can be observed and labelled on a drawing using a transmission electron microscope (TEM)?

	Mitochondrion shape	RNA and DNA	Cristae	Intermembrane space
A	Yes	Yes	Yes	Yes
B	Yes	No	Yes	No
C	Yes	Yes	No	Yes
D	Yes	No	Yes	Yes

[1 mark]