2.7 Cellular Respiration

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Course	DP IB Biology
Section	2. Molecular Biology
Topic	2.7 Cellular Respiration
Difficulty	Medium

To be used by all students preparing for DP IB Biology SL
Students of other boards may also find this useful

1

The correct answer is **C** because statements II and IV are correct

A, **B** & **D** are incorrect as:

- Statement I. is a common misconception made by students. Ventilation is a synonym of breathing however respiration is not. Breathing is the process of inhaling and exhaling air while respiration is the controlled release of energy from organic compounds in cells to make ATP. Remember that anaerobic respiration does not require oxygen but produces less ATP than aerobic respiration.
- Statement III. is false as cellular respiration is a catabolic process.

2

The correct answer is **A**. Energy stored within the phosphate bonds is released upon the hydrolysis of ATP to ADP.

B is incorrect as energy cannot be created or destroyed.

C is incorrect as ADP and Phosphate are converted to ATP during respiration.

D is incorrect as a phosphate is removed from ATP to create ADP and release energy. ATP (adenosine **tri**phosphate) converts to ADP (adenosine **di**phosphate) and phosphate. The removal of phosphate releases energy for the cell to use.

3

The correct answer is **B**.

- Although you do not need to memorize the number of ATP produced, it is helpful to know that anaerobic respiration produces about 2 ATP per glucose while aerobic respiration will produce about 36 ATP molecules per glucose.
- Yeast are used in baking and brewing and biofuel industries.

A is incorrect. A common misconception is that anaerobic always means that no oxygen is available. However, in mammalian cells, anaerobic occurs when the oxygen supply is **insufficient** and not when there is no oxygen at all.

C is incorrect as lactate build up leads to muscle fatigue and cramps.

D is incorrect as **less** ATP is produced in anaerobic than in aerobic respiration and it is ethanol that is produced by anaerobic respiration of yeast cells to make biofuels.

4

The correct answer is **C** because lactate build-up in muscle fibres occurs during vigorous exercise (when ATP is required but the oxygen supply cannot keep up with demand). The buildup of lactate lowers pH and can negatively affect enzymes, causing soreness or cramps.

A is incorrect as "ATP is still produced even in low or no Oxygen environments" is an advantage of anaerobic respiration. Remember that anaerobic respiration produces around 2 ATP molecules while aerobic respiration produces about 36/38 ATP molecules.

B is incorrect as this is an advantage (for example for running short distances).

D is incorrect as this is an advantage in baking as the bubbles allow the bread to rise.

5

The correct answer is **B** because:

- The solution in the manometer will move in the direction of the tube with the organism in it as oxygen is being taken in by the seeds through aerobic respiration, decreasing the volume and thus the pressure inside the tube.
- The liquid will go up on the left side and down on the right side due to the pressure change. It moves toward the lower volume to equalize the pressure (thus allowing for the measurement of oxygen consumption).
- This measurement would not be possible however without an alkali (sodium hydroxide in this case) as it is used to absorb the carbon dioxide produced. If no alkali was used, as the organism performs aerobic respiration, the decrease in volume due to oxygen intake by the organism would be countered by the carbon dioxide produced.

A is incorrect as sodium hydroxide does not release energy.

C is incorrect as the solution will move up the left side and the sodium hydroxide is a controlled variable.

D is incorrect as the sodium hydroxide does not react with oxygen. Sodium hydroxide reacts with the carbon dioxide produced by the insect to allow for the measurement of the consumption of oxygen gas by the seeds.

6

The correct answer is **B** because the bar graph shows how the rate of respiration increases as the temperature increases from 5°C to 35°C to 55°C regardless of the presence or absence of glucose.

A is incorrect as the opposite is true. Glucose affects the rate of oxygen consumption at higher temperatures **more** than it does at lower temperatures.

C is incorrect as glucose is broken down faster at 55°C is not a conclusion that can be drawn from this graph as the graph is measuring oxygen consumption and not glucose consumption.

D is incorrect as at the lower temperature or 5°C, the graph shows that yeast consume a similar amount of oxygen but we cannot conclude that yeast does not break down glucose at lower temperatures.

7

The correct answer is **C**. The mention of the word "accurate" suggests that this consideration is for the benefit of obtaining reliable and accurate data rather than adhering to an ethical code.

A, B & **D** are incorrect as the question asks for the statement that is **NOT** an ethical consideration that should be taken and A, B and D should all be considered.

8

The correct answer is **A** because I, II, IV all describe uses of ATP which is the form of energy our cells can use.

Osmosis does not require ATP as it is a form of passive transport.

9

The correct answer is **C**.

A is incorrect as anaerobic cell respiration produces about 2 ATP.

B is incorrect as in anaerobic cell respiration, glucose is not completely oxidized (this is why less ATP is produced).

D is incorrect as aerobic cell respiration occurs in the cytoplasm and then in the mitochondria while anaerobic respiration occurs in the cytoplasm.

10

The correct answer is **D** because:

- An alkali must be used to absorb the carbon dioxide produced so that oxygen consumption can be recorded by measuring the decrease in volume of air inside the chamber that holds the living organism.

A is incorrect as the glass beads ensure equal volumes of air in both tubes.

B is incorrect, this answer is trying to confuse you by mentioning measuring the amount of carbon dioxide consumed. The alkali will absorb the carbon dioxide in order to be able to measure the consumption of oxygen.

C is incorrect as the alkali is corrosive and potentially harmful which is why a gauze platform is used to protect the seeds from touching it.