CLASS 11 BIOLOGY EXTRA QUESTIONS

Class 11 Biology Chapter 12 Respiration in Plants – Extra Questions with Answers

Extra practice questions for Class 11 Biology Chapter 12 (Respiration in Plants), beyond the textbook. These Class 11 Biology Chapter 12 important questions are handy for last-minute exam practice.

Contents

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Very Short Answer Questions (1 mark)

Q1. What is the end product of glycolysis?
Ans: Pyruvate (pyruvic acid), 2 molecules per glucose.

Q2. Where does the Krebs cycle occur?
Ans: Mitochondrial matrix.

Q3. What enzyme produces ATP using the proton gradient?
Ans: ATP synthase.

Q4. What is the RQ value for carbohydrate respiration?
Ans: 1.

Q5. What is produced during alcoholic fermentation by yeast?
Ans: Ethanol and CO_2.

Short Answer Questions (2–3 marks)

Q6. Differentiate between aerobic and anaerobic respiration in terms of oxygen requirement and ATP yield.
Ans: Aerobic respiration requires oxygen and yields a high amount of ATP (~36-38 per glucose) through complete oxidation; anaerobic respiration (fermentation) does not require oxygen and yields much less ATP (net 2 per glucose) through incomplete oxidation.

Q7. What happens to pyruvate under aerobic conditions before entering the Krebs cycle?
Ans: It is converted (decarboxylated and oxidized) to Acetyl CoA in the mitochondrial matrix, releasing CO_2 and forming NADH.

Q8. Why is fermentation considered an incomplete oxidation of glucose compared to aerobic respiration?
Ans: Fermentation only breaks glucose down as far as pyruvate/its derivatives (ethanol or lactic acid), releasing very little of glucose's total chemical energy, whereas aerobic respiration fully oxidizes glucose all the way to CO_2 and H_2O, releasing nearly all its potential energy.

Higher-Order Thinking / Application Questions

Q9. Explain why the ATP yield from aerobic respiration (approximately 36-38 ATP per glucose) is so much higher than from anaerobic fermentation (net 2 ATP per glucose), connecting this to the roles of oxygen, the Krebs cycle, and the electron transport chain.
Ans: In anaerobic fermentation, glucose is only partially broken down via glycolysis into pyruvate, yielding a net of 2 ATP (produced directly via substrate-level phosphorylation), after which pyruvate is converted into ethanol or lactic acid solely to regenerate NAD^+ (needed to keep glycolysis running), without extracting any further useful energy from these end products, which still contain most of glucose's original chemical energy. In aerobic respiration, however, pyruvate is further oxidized (via Acetyl CoA) through the Krebs cycle, which not only produces a small amount of additional ATP directly but, more importantly, generates a large quantity of high-energy electron carriers (NADH and $FADH_2$). These electron carriers then donate their electrons to the electron transport chain on the inner mitochondrial membrane, where the electrons'

energy is used to pump protons across the membrane, creating an electrochemical gradient that drives ATP synthase to produce the vast majority of the cell's ATP through oxidative phosphorylation (chemiosmosis). Because oxygen serves as the final electron acceptor at the end of this chain (forming water), it allows the complete, stepwise extraction of nearly all the energy stored in glucose's chemical bonds, rather than the substrate simply being partially broken down and abandoned as in fermentation — this is why oxygen's presence, enabling the Krebs cycle and full electron transport chain function, allows aerobic respiration to extract roughly 18-19 times more ATP per glucose molecule compared to anaerobic fermentation.

Q10. Explain why human muscle cells switch to lactic acid fermentation during intense exercise, even though this is far less energy-efficient than aerobic respiration, and describe the physiological consequence of this switch (muscle fatigue/cramping).
Ans: During intense, prolonged physical exercise, muscle cells demand ATP for contraction at a rate that can exceed the rate at which the circulatory and respiratory systems can supply adequate oxygen to the muscle tissue, creating a temporary oxygen deficit within the working muscle cells. Since aerobic respiration (via the Krebs cycle and electron transport chain) absolutely requires oxygen as the final electron acceptor to continue functioning, when oxygen becomes insufficiently available, muscle cells cannot sustain aerobic ATP production fast enough to meet the immediate, urgent energy demand. To continue generating at least some ATP quickly (via glycolysis, which does not require oxygen) and to keep glycolysis running by regenerating the NAD^+ it needs, muscle cells switch to lactic acid fermentation, converting pyruvate into lactic acid (also regenerating NAD^+ in the process), allowing glycolysis (and its modest net 2 ATP yield per glucose) to continue operating even without oxygen, providing at least some ATP to sustain muscle contraction in the short term. However, this comes at a cost: the lactic acid produced accumulates in the muscle tissue, lowering local pH and interfering with muscle enzyme function and contraction, which is a major contributing factor to the burning sensation, muscle fatigue, and cramping experienced during and after intense exercise, until the accumulated lactic acid is later cleared (often converted back to pyruvate and further metabolized, or transported to the liver) once oxygen supply is restored during recovery.

Class 11 Biology Chapter 12 – Solutions and Notes

For complete step-by-step answers and a quick summary, check the Class 11 Biology Chapter 12 Solutions and Class 11 Biology Chapter 12 Revision Notes.

See also: Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6 | Chapter 7 | Chapter 8 | Chapter 9 | Chapter 10 | Chapter 11 | Chapter 12

Practice more: Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6 | Chapter 7 | Chapter 8 | Chapter 9 | Chapter 10 | Chapter 11

Quick revision: Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6 | Chapter 7 | Chapter 8 | Chapter 9 | Chapter 10 | Chapter 11