Respiration in Plants

Assertion Reason Questions

Given below are two statements labelled as Assertion (A) and Reason (R). Select the most appropriate answer from the options given below:

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true and R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

1. Assertion (A): Glycolysis is the breakdown of glucose into pyruvate. **Reason (R):** It occurs in mitochondria.

Ans. (c) A is true but R is false.

Explanation: Glycolysis means splitting of sugar which produces two molecules of pyruvate at the end. It was given by scientists Gustav Embden, Otto Meyerhof and J. Parnas. It is also referred to as EMP Pathway. It occurs in cytoplasm of the cells.

2. Assertion (A): Citric Acid Cycle takes place in mitochondrial matrix. **Reason (R):** The above-mentioned cycle starts with condensation of acetyl group with oxaloacetic acid and water.

Ans. (a) Both A and R are true and R is the correct explanation of A. **Explanation:** Acetyl group of acetyl-CoA condenses with oxaloacetate and water to produce citric acid. This reaction is catalysed by enzyme citrate synthase and a molecule of CoA is released.

3. Assertion (A): Cytochrome-c is a small protein.

Reason (R): Cytochrome-c acts as a mobile carrier for transfer of electrons.

Ans. (a) Both A and R are true and R is the correct explanation of A. **Explanation:** Cytochrome-c is a small protein acting as a mobile carrier for transfer of electrons between complex III and complex IV. It is found attached to the outer surface of the inner mitochondrial membrane.

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4. Assertion (A): In oxidative phosphorylation, oxygen acts as final hydrogen acceptor. **Reason (R):** Proton gradient required for phosphorylation is produced by energy of oxidation- reduction.

Ans. (a) Both A and R are true and R is the correct explanation of A. **Explanation:** Role of oxygen is limited, i.e. used in terminal stage, but presence is vital. It drives the whole process by removing hydrogen from the system and acts as the final acceptor of hydrogen. Since energy of oxidation and reduction is utilized for producing a proton gradient which is essential for phosphorylation thus this process is termed as oxidative phosphorylation.

5. During exercise, muscle ATP demand increases with intensity, and at the highest power output, ATP consumption may increase more than 100-fold above the resting level. The rate of mitochondrial ATP production during exercise depends on the availability of O₂, carbon substrates, reducing equivalents, ADP, Pi, free creatine, and Ca^{2+.}



Assertion (A): More ATPs are produced during aerobic respiration than anaerobic respiration.

Reason (R): Site for aerobic respiration is mitochondria and that of anaerobic respiration is cytoplasm.

Ans. (b) Both A and R are true and R is not the correct explanation of A. **Explanation:** Aerobic respiration takes place in mitochondria. Anaerobic respiration takes place in the cytoplasm. Aerobic respiration makes much more energy in the form of ATP from glucose molecules than anaerobic respiration does. Aerobic respiration makes 36 to 38 ATP per glucose molecule whereas anaerobic respiration makes only 2 ATP per glucose molecule.

