CBSE TEST PAPER-02

CLASS - XI BIOLOGY (Respiration in Plants)

General Instruction:

- All questions are compulsory.
- Question No. 1 to 3 carry one marks each. Question No. 4 to 6 carry two marks each. Question No. 7 and 8 carry three marks each. Question No. 9 carry five marks.

1. What are the other two names for kreb's cycle?

2. In which organelle does kreb's cycle occur in living cells?

3. Mention the conditions under which

(i) R.Q is 1

(ii) R.Q is less than 1

4. What is respiration?

5. Why less energy is produced during anaerobic respiration?

6. What is the function of phosphofructokinase in glycolysis?

7. Explain Respiratory Balance sheet.

8. What is the significance of stepwise release of energy in respiration?

9. Explain ETS.

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CLASS - XI BIOLOGY (Respiration in Plants)

[ANSWERS]

General Instruction:

- All questions are compulsory.
- Marks are given alongwith their questions.

Ans 01. Citric acid cycle (CAC), Tricarboxylic acid cycle (TCA)

Ans 02. Mitochondria.

Ans 03. (i) If carbohydrates are used as substrate and are fully oxidized the R.Q will be 1.

(ii) If fats are used in respiration, the R.Q well be less than 1.

Ans 04. A process of physiochemical change by which environmental oxygen is taken into, to oxidize the stored food, for release of CO_2, water and energy. The energy released is used for doing various life activities, where as CO_2 is used by the plants.

Ans 05. i) Incomplete breakdown of respiratory substrate takes place.

ii) Some of the products of anaerobic respiration can be oxidized further to release energy which shows that anaerobic respiration does not liberate the whole of energy contained on the respiratory substrate.

iii) O_2 is not utilized for securing electrons & protons.

iv) $NADH_2$ does not produce ATP as electron transport is absent.

Ans 06. It catalyses the formation of fructose -1, 6- biphosphate from fructose-6- phosphate and adenosine –tri- phosphate (ATP) Fructose -1,6- biophosphate is splited into 2 molecules of triose phosphate – 3 phosphoglyceraldhyde and dihydroxyacetone phosphate.

Ans 07. a) As equetial, orderly pathway functioning, with one substrate forming next one with glycolysis, TCA cycle and ETS pathway following one after another.

b) NADH synthesized in glycolysis. It is transferred into mitochondria and undergoes oxidative phosphorylation.

c) None of intermediates in pathway are used to form any other compound.

d) Only glucose is being respired; no other alternative substrates enter in pathway at any of intermediary stages.

Ans 8. Advantages of step wise oxidation during respiration-

a) It facilitates the utilization of a relatively higher proportion of that energy in ATP synthesis.

b) Activities of enzymes for the different steps may be enhanced or inhibited by specific compounds. This provides a means of controlling the rate of the pathway and the energy output according to the need of the cell.

c) The same pathway may be utilized for forming intermediates used in the synthesis of other biomolecules like amino acids.

Ans 09. Mechanism of Electron transport system – Glucose molecule is completely oxidized by the end of the citric acid cycle. The energy is not released unless NADH and FADH are oxidized through the ETS. The oxidation means 'removal of electrons from it'. Metabolic pathway through which the electron passes from one carrier to another is called "Electron transport system" It is operative in the inner mitochondria membrane. Electrons from NADH produced in mitochondrial matrix are oxidized by NADH dehydrogenase (complex I) and electrons are then transferred to ubiqinone located within the inner membrane also receives reducing equivalents via FADH; that is generated during oxidation of succinate, through activity of enzyme named succinate dehydrogenase (complex II). Reduced ubiquinone is then oxidized with the transfer of electrons to cytochrome complex (complex III). Cytothrome is small protein attached to outer surface of inner membrane and acts as a mobile carrier for transfer of electrons between complex III and complex IV. (complex IV) is cytochrome 'c' oxidize complex having cytochromes 'a' and a_3.

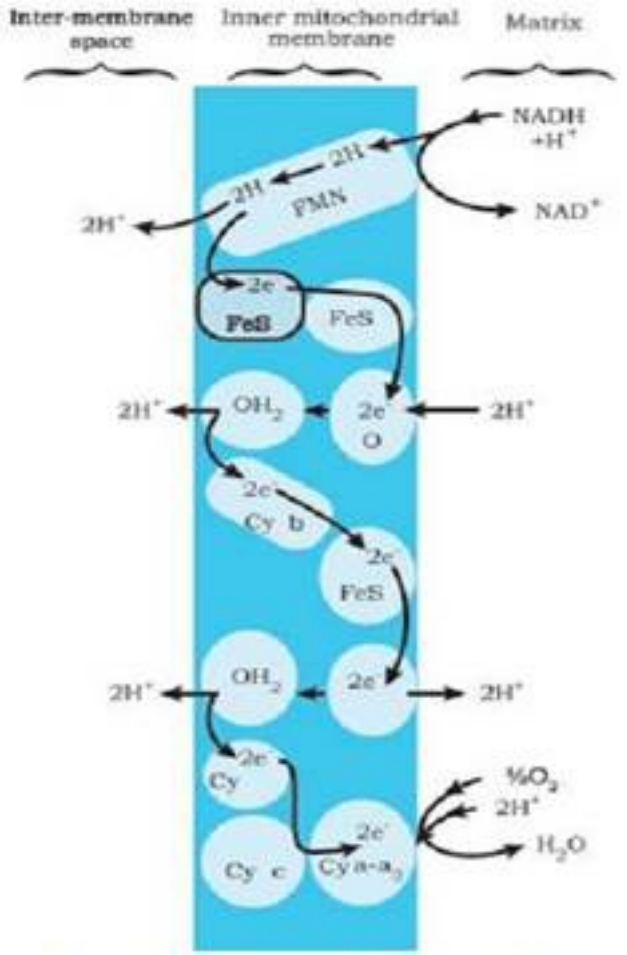

Figure 14.4 Electron Transport System (ETS)

When electron pass from one carries to another via complex I to IV in ETS, they are coupled to ATP synthase (complex V) for production ATP from ADP and inorganic phosphate. Oxidation of one molecule of NADH, gives rise to 3 molecules of ATP, while that of FADH, produces 2 molecules of ATP. Electrons are carried ed by cytochromes and recombine with their protons before the final stage when hydrogen atom is accepted by oxygen to form water. O_2 acts as final hydrogen acceptor. Whole process by which oxygen allows the production of ATP by phosphorylation of ADP is called ‘oxidative phosphorylation’.