

Chapter 10. Respiration in Plants

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Solution 1:

- (a) Respiration is the process of oxidation and decomposition of organic compounds like simple carbohydrate glucose in the living cells with the release of energy.
- (b) Respiratory substrate is a substance which is oxidized to yield energy necessary for cell maintenance and growth. Example – Carbohydrates and fats
- (c) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + H_2O + 673 \text{ kcal energy (38 ATP)}$
- (d) Alcoholic fermentation is a biological process in which hexose sugars such as glucose and fructose are converted into cellular energy and thereby produce ethanol and carbon dioxide as metabolic waste products.
- (e) Glycolysis
- (f) Cytoplasm of cell
- (g) Mitochondria

Solution 2:

(a)

| Fermentation | Anaerobic respiration |
|--|-----------------------------|
| It occurs in microorganisms and yeast. | It occurs in higher plants. |

(b)

| Aerobic respiration | Anaerobic respiration |
|--|---|
| Occurs in presence of oxygen | Occurs in absence of oxygen |
| Complete oxidation of glucose takes place | Incomplete oxidation of glucose takes place |
| More energy is liberated | Less energy is liberated |
| End-products are water and carbon dioxide | End-products are ethyl alcohol and carbon dioxide |
| It takes place in cytoplasm and mitochondria | All the reactions occur in cytoplasm. |

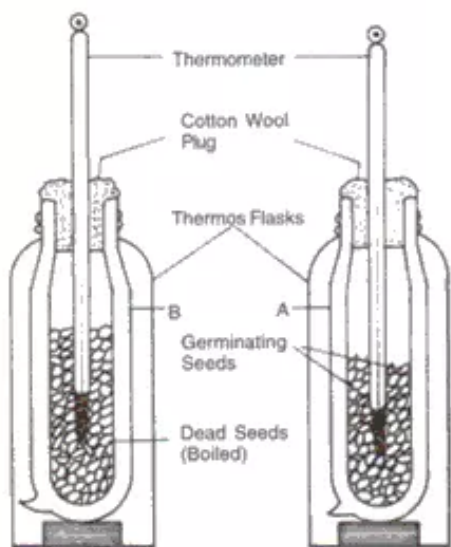
(c)

| Respiration | Combustion |
|--|---|
| It takes place in living cells only. | It does not occur in living cells only. |
| Food material is oxidized stepwise, accompanied with stepwise release of energy. | The substrate is oxidized at random and energy is released from the spontaneous breakdown of foodstuff. |
| Most of the energy released is stored in the form of ATP. | The energy released is lost in the form of light and heat. |
| It is a continuous process | It is not a continuous process |

Solution 3:

Take two thermos flasks. In the first flask, keep some germinated seeds and a little water to keep them moist. In the second flask, keep some boiled seeds. Place corks fitted with thermometers on both the flasks. Keep the flasks airtight. Note the temperature in both the thermometers. Leave the flasks for sometime and again record the temperature.

It is observed that the temperature of the first set increases and in the second case, it is not affected. The rise in temperature is because during respiration, germinated seeds release some energy in the form of heat energy.



Heat production in germinating seeds

Solution 4:

Yes, respiration is the reverse of photosynthesis.

Solution 5:

1. – (b) nutrients are oxidized without using molecular oxygen by the process of fermentation.
2. – (c) is the best organic substrate for respiration.
3. – (a) partial breakdown of food substance.
4. – (e) the series of change from glucose to pyruvic acid in respiration.
5. – (d) the intermediate substance in the breakdown of glucose.

Solution 6:

- (a) Aim – To show that carbon dioxide is released during respiration.
- (b) To prevent photosynthesis
- (c) To absorb carbon dioxide from incoming air.
- (d) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + H_2O + 673 \text{ kcal energy (38 ATP)}$
- (e) The respiratory chamber should be covered with a black cloth to prevent photosynthesis.

The lime water in Flask A turns milky as the plant respire and gives out carbon dioxide which turns the lime water milky. The lime water in Flask B remains clear as the incoming air is free from carbon dioxide.

Solution 7:

- (a) Anaerobic
- (b) Glycolysis
- (c) Pyruvic acid
- (d) Oxygen
- (e) Cytoplasm

Solution 8:

- (a) False
- (b) False
- (c) False
- (d) False
- (e) False

Solution 9:

- (a) To show that heat is evolved during respiration
- (b) In flask A, moist seeds respire and produce heat that increases the temperature.
- (c) If formalin was not used, bacteria will grow on the dry seeds and respire anaerobically to produce a little heat.

Solution 10:

glucose ATP

Solution 11:

- (a) $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2 + 21\text{kcal energy (2 ATP)}$

(b)

| Respiration | Photosynthesis |
|---|---|
| Respiration is a catabolic process during which food material is broken down and energy is released | Photosynthesis is an anabolic process during which food material is synthesized and energy is stored. |
| The dry weight of plant decreases. | The dry weight of plant increases. |
| Oxygen is used here. | Oxygen is released. |
| Carbon dioxide is released. | Carbon dioxide is used up. |



Solution 12:

- (a) To absorb carbon dioxide produced during respiration
- (b) If these are not soaked in disinfectant, the bacterial growth may be there in the tube Y and accurate result may not be obtained due to bacterial respiration.
- (c) The germinating peas respire and oxygen is used which create a vacuum in the tube. So coloured water has risen in tube1.
- (d) Respiration
- (e) It is defined as the stepwise oxidation of glucose in the living cells to release energy.

Solution 13:

- (a) mitochondria
- (b) Fermentation

Solution 14:

| | |
|--|--|
| Glycolysis | Kreb's cycle |
| It occurs in both aerobic and anaerobic respiration. | It occurs only in aerobic respiration, but not in anaerobic respiration. |
| It occurs in the cytoplasm of cell. | It occurs in mitochondria of cell. |

Solution 15:

| | |
|--|--|
| Aerobic respiration | Anaerobic respiration |
| End-products are water and carbon dioxide. | End-products are ethyl alcohol and carbon dioxide. |

Solution 16:

- (a) Respires
- (b) Day and night
- (c) Aerobic respiration
- (d) Rises
- (e) Controlled manner

PAGE NO: 90**Solution 17:**

- (a) Respiration
- (b) ATP
- (c) Aerobic respiration
- (d) Anaerobic respiration
- (e) Caustic potash and KOH
- (f) Lime water
- (g) Carbon dioxide and water
- (h) Ethyl alcohol and carbon dioxide

Solution 18:

- (i) (c) Glucose is converted to carbon dioxide and water, releasing energy.
- (ii) (d) Glycolysis, Kreb's cycle, electron transfer
- (iii) (c) Energy is left in alcohol.
- (iv) (d) To accept hydrogen and form water.
- (v) (b) CO₂ and alcohol

- (vi) (c) mitochondria
- (vii) (b) Hens Krebs
- (viii) (d) fermentation
- (ix) (b) ATP
- (x) (c) ATP
- (xi) (b) Two
- (xii) (a) In cytoplasm
- (xiii) (c) 673 Kcal

