

Class:	IX	Board:	ICSE	Date & Time:	
Topic:	BIOLOGY: RESPIRATION IN PLANTS			Marks:	

Q1. Define the following:

1. **Respiration**- It is the process of step wise oxidation of glucose in the living cells to release energy.
2. **Fermentation**- It is a type of anaerobic respiration in which glucose is incompletely broken down into ethyl alcohol and carbon dioxide by micro- organisms.
3. **Glycolysis**- It is phase of respiration in which a sequence of reactions takes place which converts glucose into pyruvic acid with the production of ATP.
4. **Respiratory substrate**- The organic substances which can be catabolised to liberate energy during respiration are called as respiratory substrate.
5. **Aerobic respiration**- The complete breakdown of glucose into carbon dioxide and water in the presence of oxygen.
6. **Anaerobic respiration**- The incomplete breakdown of glucose into ethyl alcohol and carbon dioxide in the absence of oxygen.

Q2. Distinguish between:

1. Respiration and Combustion

Respiration	Combustion
<ul style="list-style-type: none"> • It takes place in living cells • It is a slow process • It is a biochemical process. Breakdown of organic matter is controlled by enzymes • Less heat is produced 	<ul style="list-style-type: none"> • Living cells are not needed for this process • It is a fast process • It is a physio- chemical process. Enzymes are not needed. • More heat is produced.

2. Aerobic and Anaerobic respiration

Aerobic respiration	Anaerobic respiration
<ul style="list-style-type: none"> • It takes place in the presence of oxygen • It involves the complete breakdown of glucose • It takes place in cytoplasm and mitochondria • Its products are carbon dioxide and water 	<ul style="list-style-type: none"> • It takes place in the absence of oxygen • It involves the incomplete breakdown of glucose. • It takes place in cytoplasm • Its products are ethyl alcohol and carbon dioxide.

3. Fermentation and Anaerobic respiration

Fermentation	Anaerobic respiration
<ul style="list-style-type: none">• It takes place in microorganisms• It is extracellular	<ul style="list-style-type: none">• It takes place in higher plants and animal tissues without oxygen• It is intracellular

4. Glycolysis and Krebs's cycle

Glycolysis	Kreb's Cycle
<ul style="list-style-type: none">• It takes place in cytoplasm• Pyruvic acid is produced during glycolysis	<ul style="list-style-type: none">• It takes place in mitochondria• Pyruvic acid is used in Kreb's cycle

5. Respiration and Photosynthesis

Respiration	Photosynthesis
<ul style="list-style-type: none">• It takes place in all living cells• It is catabolic process• CO₂ is given out• It takes place all time	<ul style="list-style-type: none">• It takes place only in chlorophyll bearing cells• It is an anabolic process• Oxygen is given out• It takes place in day time only

Q3. Answer the following:

1. What is respiration?

Ans- It is the stepwise oxidation of glucose in the living cells to produce energy.

2. What are the phases of respiration?

Ans- Glycolysis, Kreb's cycle, respiratory chain.

3. What is aerobic respiration?

Ans- The complete breakdown of glucose in the presence of oxygen is called as aerobic respiration.

4. What is anaerobic respiration?

Ans- The incomplete breakdown of glucose in the absence of oxygen is called as anaerobic respiration.

5. What is glycolysis?

Ans- The sequence of reactions which convert glucose to pyruvic acid with the production of ATP is called glycolysis.

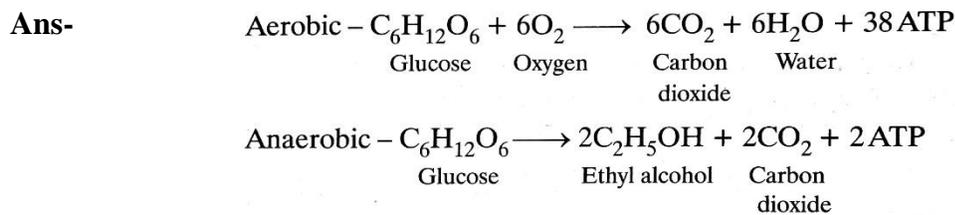
6. What is Kreb's cycle?

Ans- The cycle in which pyruvic acid formed during glycolysis is oxidised into carbon dioxide and water.

7. What is fermentation?

Ans- The incomplete breakdown of glucose to ethyl alcohol and carbon dioxide by micro-organism is called fermentation.

8. Write an equation to represent aerobic and anaerobic respiration.



9. How is the tilling of the soil useful for the crops?

Ans- Tilling makes the soil porous and airy. The underground parts of plants get sufficient oxygen.

10. Write the full form of ATP and ADP.

Ans- Adenosine triphosphate- ATP

Adenosine diphosphate- ADP

11. Why is it difficult to demonstrate respiration in green plants?

Ans- During respiration plants give out carbon dioxide that they use for photosynthesis. So, it is difficult to demonstrate respiration in green plants.

12. What happens to the energy released in respiration?

Ans- The energy released in respiration is stored in ATP molecules in mitochondria.

13. What are the sites of glycolysis and Kreb's cycle?

Ans- Glycolysis- Cytoplasm

Kreb's cycle- Mitochondria

14. Why is glycolysis considered as an important stage of respiration?

Ans- Glycolysis is common to both aerobic and anaerobic respiration. So, it is considered as an important stage of respiration.

15. Why is anaerobic respiration being less efficient?

Ans- It is the incomplete breakdown of glucose and produces less amount of energy. So, it is less efficient.

16. Explain briefly why seeds sown deep in the soil fail to germinate?

Ans- Deep in the soil oxygen content is less, so seeds sown deep inside will not get oxygen for germination.

17. What is common in aerobic and anaerobic respiration?

Ans- Both uses the same substrate, glucose for respiration
Both releases energy.

18. How do roots respire?

Ans- Roots respire through epidermis by the process of diffusion.

19. What is the importance of fermentation?

Ans- Fermentation is a type of anaerobic respiration by micro- organism. It converts glucose to ethyl alcohol and carbon dioxide. This process is used to manufacture bread, wine, etc.

20. State the common function performed by stomata and lenticels.

Ans- Respiration

21. List different ways of gaseous exchange in plants.

Ans- Gaseous exchange in plants occurs through:

- a. Stomata [on leaves]
- b. Lenticels [on the bark of old trees]
- c. General surface of root
- d. Pneumatophores.

Q4. Diagram based questions:

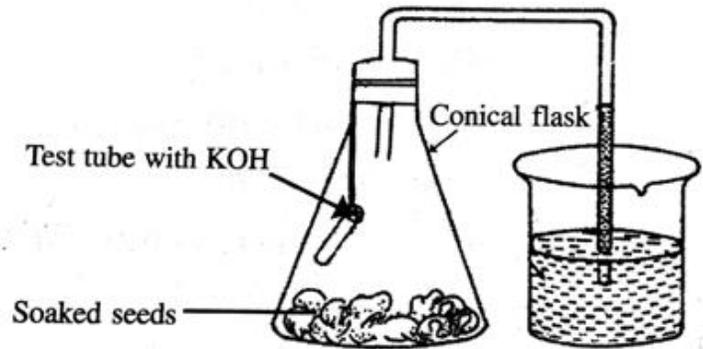
1. The figure alongside represents an experiment set-up.

a. What is the aim of the experiment?

Ans- The aim of the experiment is to show that respiration takes place in germinating seeds.

b. Why has the water in a tube been risen?

Ans- Seeds use oxygen for respiration and vacuum is created in the tube and water has been risen.



c. What is the purpose of KOH?

Ans- To absorb carbon dioxide released by the seeds.

d. Is there any control for this experiment? If so, mention it.

Ans- Yes. Take another conical flask with boiled seeds.

e. What precautions should be taken for this experiment?

Ans- The flask should be airtight.

2. The following diagram shows an experimental setup demonstrated in plants :

a. What is the aim of the experiment?

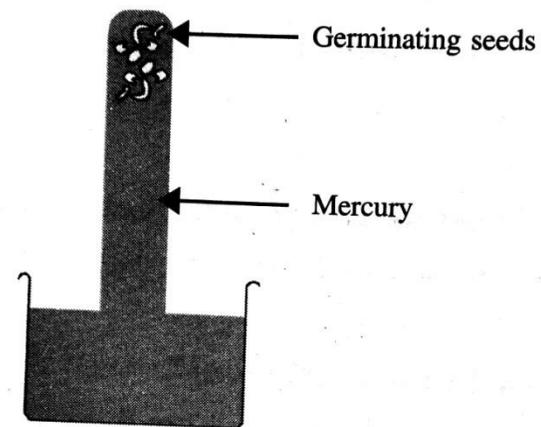
Ans- To show that carbon dioxide is liberated during anaerobic respiration.

b. Write the equation for the process mentioned in (i) above.

Ans- $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2 + 2ATP$

c. Name a plant which respire anaerobically.

Ans- Bacteria/ Yeast.



3. How will you show that heat is given out during respiration?

Ans- Take two thermos flasks A and B. Keep some germinating seeds in A and dry seeds in B. Insert a thermometer in each flask. Close the mouth of the flasks with cork. Note the initial temperature. After two days again note the temperature. There is rise in temperature in flask A showing that germinating seeds respire and produce heat. While in flask B no change is there since the flask contain dry seeds.

4. In order to study and prove a particular physiological process in plants, the following experiment was set up. Study the same and answer the following :

a. Name the physiological process being studied.

Ans- Aerobic Respiration

b. What is the function of soda lime in the bottle A and why is lime water placed in bottle B?

Ans- To remove the carbon dioxide from incoming air. To insure that all the carbon dioxide present in the air has been absorbed/ air entering the bottle 'C' is free from carbon dioxide.

c. What change would you expect to observe in bottle D?

Ans- Lime water turns milky.

d. Represent the physiological process named in (i) above in the form of a chemical equation.

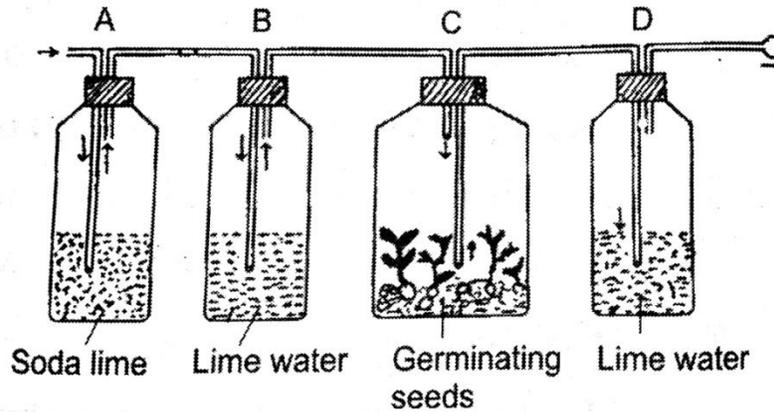
Ans- $C_6H_{12}O_6 + 6O_2 \text{ -----} > 6CO_2 + 6H_2O + \text{Energy}$

e. In order to obtain accurate results, the bottle C should be covered with black cloth. Why?

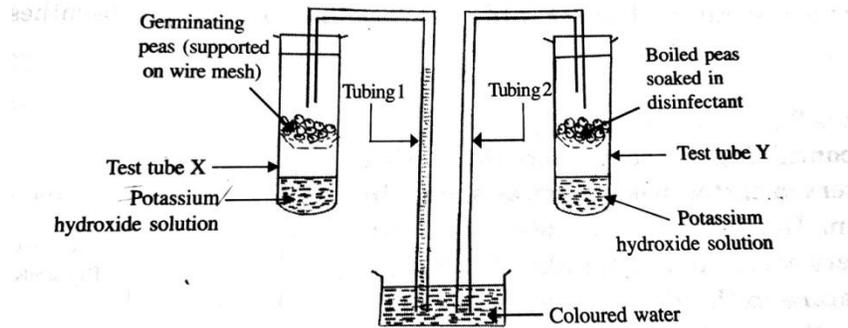
Ans- To prevent photosynthesis thereby insuring that carbon dioxide produced during respiration is not used up affecting the accurate results.

f. If bottle C fitted with a 3 holed rubber stopper and a thermometer was introduced in such a way that its bulb reaches close to the germinating seeds, what would you observe? Why?

Ans- Mercury level would rise proving that heat is produced during respiration.



5. The following diagram refers to an apparatus which is used to demonstrate a physiological process :



a. What is the purpose of keeping potassium hydroxide solution in test tubes X and Y?

Ans- To absorb carbon dioxide produced during respiration.

b. What is the purpose of keeping boiled peas soaked in a disinfectant in test tube Y?

Ans- If these are not soaked in disinfectant the bacterial growth may be there in the tube Y and accurate result may not get due to bacterial respiration.

c. Why has coloured water risen in tubing?

Ans- The germinating peas respire and oxygen is used which creates a vacuum in the tube. So coloured water has risen in the tubing I.

d. Name the biological process which causes the above rise?

Ans- Respiration.

e. Define the biological process shown in the experiment.

Ans- It is stepwise oxidation of glucose in the living cells to release energy.

6. The apparatus given below was set up to demonstrate a particular process occurring in plants. Study the same and answer the following questions :

a. Name the process.

Ans- Respiration

b. What is the object of the experiment?

Ans- The object is to show that CO₂ is given out during respiration.

c. Why is soda lime placed in tube?

Ans- To absorb carbon dioxide from incoming air so as to make plant free from carbon dioxide.

d. What change, if any, would you observe in the lime water in flask A and in Flask B? In each case give reason for your answer.

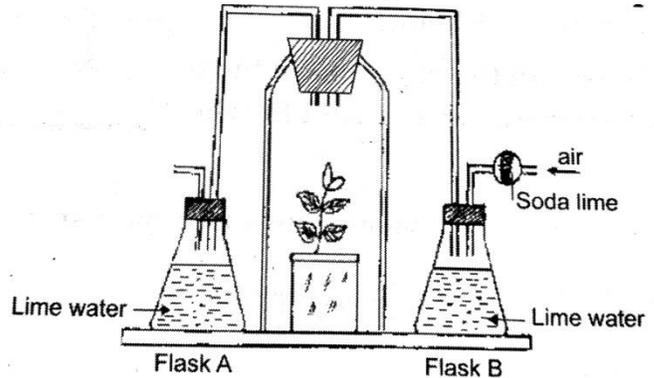
Ans- The lime water in flask A turns milky as the plant respire and gives out carbon dioxide which turns the lime water milky. The lime water in flask B remains clear as the incoming air is free of carbon dioxide by the soda lime.

e. Mention one precaution that should be taken to ensure more accurate results.

Ans- Cover the respiratory chamber with black cloth to prevent photosynthesis.

f. Give an overall balanced equation to represent the process.

Ans- $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{Energy}$



7. Two thermos flasks, one containing moist seeds and other containing dry seeds were fitted with thermometers in cotton wool plugs as shown in the diagrams. The initial temperature on both thermometers were noted. After 48 hours the temperature in flask A was found to be much higher than in flask B.

a. State the object of using apparatus.

Ans- To show that heat is evolved during respiration.

b. Explain why a rise in temperature occurs in flask A.

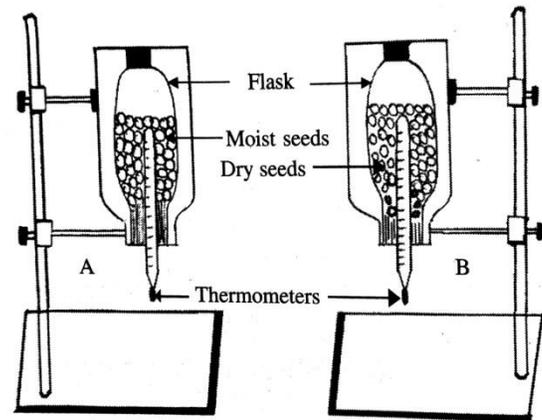
Ans- In flask A moist seeds respire and produce heat that increases the temperature.

c. If 5% formalin was not used after boiling the seeds, the temperature of flask B would have risen considerably, Explain.

Ans- If formalin was not used, bacteria will grow on the dry seeds and respire anaerobically to produce a little heat.

d. Why were the flasks inverted?

Ans- The seeds completely surround the bulb of thermometer and accurate reading can be noted.



8. The adjoining figure shows an experiment performed on germinating seeds. Study the same and answer the following questions :

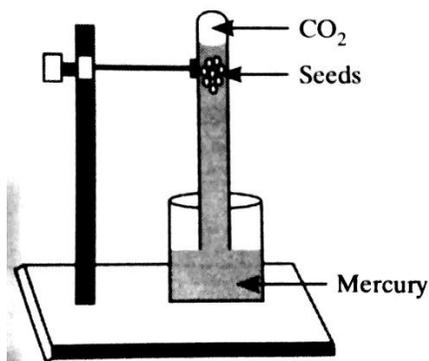
a. What is the aim of the experiment?

Ans- The aim of the experiment is to demonstrate anaerobic respiration.

b. Write the chemical equation for the process mentioned in (i) above.

Ans- $C_6H_{12}O_6 \xrightarrow{\hspace{2cm}} 2C_2H_5OH + 2CO_2 + \text{Energy}$

c. Draw a neat labelled diagram of the apparatus as it would appear after 24 hours.



Ans-

d. The soaked seeds used in the experiment have their seed coats removed. Give reason for the same.

Ans- The removal of seed coat helps in the easy diffusion of gases.

Q5. Give reasons:

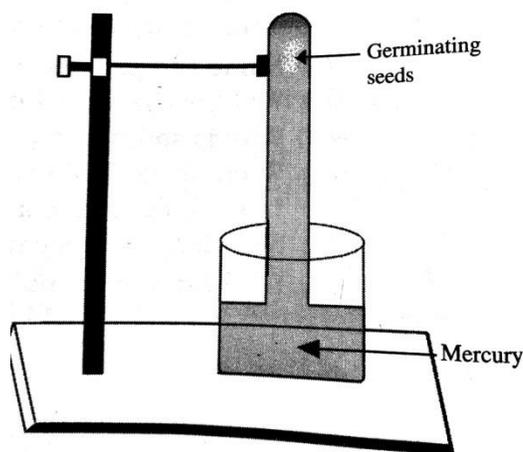
1. **Respiration occurs at optimum temperature.**

Ans- Respiration is a catabolic process which requires enzymes. At high temperature, the enzymes are denatured and at very low temperature, they cannot function. So, optimum temperature is required.

2. **One should not sleep under a tree at night.**

Ans- At night, droppings of the birds may fall on the person, under the tree, also insects, snakes, etc. are a real threat. Also in night, plant releases carbon dioxide which leads to suffocation.

3. **We use yeast for manufacturing of wine. Give reason.**



Ans- Yeast helps in the fermentation of glucose. Yeast respire anaerobically to produce ethyl alcohol and carbon dioxide.

4. Farmers plough the field before planting crops.

Ans- Ploughing the field makes the soil airy and porous. When the soil is loosened, the roots of the plants can take oxygen present in the soil by diffusion.

5. Tiling of soil is useful for the crop.

Ans- Tiling makes the soil porous and airy. Oxygen supply is increased and yield will increase.

6. It is difficult to demonstrate respiration in green plants.

Ans- During respiration plants give out carbon dioxide, green plants use this gas for photosynthesis.

7. Respiration is an important process for living organisms.

Ans- Respiration provides energy for all metabolic activities. So, it is an important process.