CHAPTER-10

RESPIRATION IN ORGANISMS

SOLUTIONS:

EXERCISES

1. Why does an athlete breathe faster and deeper than usual after finishing the race?

Ans: An athlete consumes a lot of energy during running which is produced by oxidation of glucose. By breathing deeper and faster, the athlete is basically consuming more and more oxygen to meet his or her requirements. During the run, the demand of energy is high but the supply of oxygen to produce energy is limited.

2. List the similarities and differences between aerobic and anaerobic respiration.

Ans: The similarity between aerobic and anaerobic respiration is that both break down the food to release carbon dioxide and energy. That is, they both produce energy and give out carbon dioxide.

Differences:

Aerobic respiration	Anaerobic respiration
i) Food is broken down in the presence of oxygen.	i) Food is broken down in the absence of oxygen.
ii) The end products are water, carbon dioxide and energy.	ii) The end products are alcohol, carbon dioxide and energy
iii) Large amount of energy is releases.	iii) Small amount of energy is release
iv) E.g. Human beings	iv) Yeast

3. Why do we often sneeze when we inhale a lot of dust-laden air?

Ans: By sneezing, our body tries to expel the dust particles from the air we inhaled so that only clean air enters our body.

4. Take three test-tubes. Fill 3/4th of each with water. Label them A,B and C. Keep a snail in test-tube B and C, keep snail and plant both. Which test-tube would have the highest concentration of CO2?

Ans: Test-tube A will have the highest concentration of CO2 because snail will take in oxygen and gives out CO2. In test-tubes B and C, the CO2 will be utilized by the water plant for synthesizing food and hence there will be less concentration of CO2 in these.

5. Tick the correct answer:

a) In cockroaches, air enters the body through

i) Lungs

ii) Gills

iii) Spiracles

iv) Skin

Ans: iii) Spiracles

b) During heavy exercise, we get cramps in the legs due to the accumulation of

i) Carbon dioxide

ii) Lactic acid

iii) Alcohol

iv) Water

Ans: ii) Lactic acid

c) Normal range of breathing rate per minute in an average adult person at rest is:

i) 9-12

ii) 15-18

iii) 21-24

iv) 30-33

Ans: ii) 15-18

d) During exhalation, the ribs

i) Move outwards

ii) Move downwards

iii) Move upwards

iv) Do not move at all

Ans: ii) Move downwards

6. Match the items in Column I with those in Column II

Column I	**Column II**
a) Yeast	**i) Earthworm**
b) Diaphragm	**ii) Gills**
c) Skin	**iii) Alcohol**
d) Leaves	**iv) Chest cavity**
e) Fish	**v) Stomata**
f) Frog	**vi) Lungs and skin**
	vii) Tracheae

Ans:

Column I	Column II
a) Yeast	iii) Alcohol
b) Diaphragm	iv) Chest cavity
c) Skin	i) Earthworm
d) Leaves	v) Stomata
e) Fish	ii) Gills
f) Frog	vi) Lungs and Skin

7. Mark 'T' if the statement is true and 'F' if it is false:

i) During heavy exercise the breathing rate of a person slows down. (T/F)

Ans: False

ii) Plants carry out photosynthesis only during the day and respiration only a night. (T/F)

Ans: False

iii) Frogs breathe through their skins as well as their lungs. (T/F)

Ans: True

iv) The fishes have lungs for respiration. (T/F)

Ans: True

v) The size of the chest cavity increases during inhalation.

Ans: True

8. Given below is a square of letters in which are hidden different words related to respiration in organisms. These words may be present in any direction-upwards, downwards, or along the diagonals. Find the words for your respiratory system. Clues about those words are given the square.

S	V	M	P	L	U	N	G	S
C	Z	G	Q	W	X	N	T	L
R	M	A	T	I	D	O	T	C
I	Y	R	X	Y	M	S	R	A
B	R	H	I	A	N	T	A	Y
S	T	P	T	B	Z	R	C	E
M	I	A	M	T	S	I	H	A
S	P	I	R	A	C	L	E	S
N	E	D	K	J	N	S	A	T

i) The air tubes of insects

ii) Skeletal structures surrounding chest cavity

iii) Muscular floor of chest cavity

iv) Tiny pores on the surface of leaf

v) Small openings on the side of the body of an insect.

vi) The respiratory organs of human beings

vii) The openings through which we inhale.

viii) An anaerobic organism.

ix) An organism with tracheal system.

Ans.

i) Trachea

ii) Ribs

iii) Diaphragm

iv) Stomata

v) Spiracles

vi) Lungs

vii) Nostrils

viii) Yeast

ix) Ant

9. **The mountaineers carry oxygen with them because:**
   a) **At an altitude of more than 5 km there is no air**
   b) **The amount of air available to a person is less than that available on the ground**
   c) **The temperature of air is higher than that on the ground**
   d) **The pressure of air is higher than that on the ground.**

Ans: b) The amount of air available to a person is less than that available on the ground.

EXTENDED LEARNING- ACTIVITIES AND PROJECTS

1. **Observe fish in an aquarium. You will find flap like structures on both sides of their heads. These are flaps which cover the gills. These flaps open and close alternately. On the basis of these observations, explain the process of respiration in the fish.**

Ans: Fishes have gills as respiratory organs. There are two gills, one on either side of the head. Gills are projections of the skin which are supplied with blood vessels for exchange of gases. In some fishes each gill is covered with a flap which opens and closes alternatively. Their opening and closing is related to the opening and closing of the mouth.

When mouth of the fish opens, it engulfs water which passes over the gill. During this period exchange of gases takes place in the gills. In this period, the gill flap (called operculum) remains closed. After exchange of gases, the gill flap opens and the water is pushed out.

2. **Visit a local doctor. Learn about the harmful effects of smoking. You can also collect material on this topic from other sources. You can seek help of your teacher or parents. Find out the percentage of people of your area who smoke. If you have a smoker in your family, confront him with the material that you have collected.**

Ans: The harmful effect of smoking is very severe. Due to smoking, the smoke particles get deposited on the respirating surface affecting absorption of oxygen and release of carbon dioxide from the body. Moreover, nicotine present in tobacco smoke cause constriction of blood vessels and irritation of windpipe. Thus, smoke,

increased concentration of carbon dioxide and constant irritation may cause T.B., bronchitis and lung cancer.

3. **Visit a doctor. Find out about artificial respiration. Ask the doctor:**
   a) **When does a person need artificial respiration?**
   b) **Does the person need to be kept on artificial respiration temporarily or permanently?**
   c) **From where can the person get supply of oxygen for artificial respiration?**

Ans:

a) When there is insufficient supply of oxygen due to lung troubles, heart troubles or drowning etc., the patient need artificial supply of oxygen.

b) Artificial respiration is the arrangement to provide exchange of gases (oxygen and CO2) to revive organs of the patient. It is not a permanent solution. However, some patients may be kept on artificial respiration to survive but they are not able to work or to do other social activities.

c) The patient is supplied with oxygen cylinder having compressed oxygen gas stored in it.

4. **Measure the breathing rate of children of the members of your family and some of your friends. Investigate:**
   a) **If the breathing rate of children is different from that of adults.**
   b) **If the breathing rate of males is different from that of females. If there is a difference in any of these cases, try to find the reason.**

Ans:

a) Yes, breathing rate of children is always more than adults because they are more active and require more oxygen for their metabolic activities.

b) Yes, breathing rate of females is usually more than males. The rate of breathing is mostly determined by the heart and lungs. Men can achieve a higher heart rate than women. This affects the amount of oxygen the lungs and heart can deliver to the body. In addition, men have a larger heart and lungs capacity compared to women.

EXTRA QUESTIONS AND ANSWERS

1. **What is a cell? What are the functions perform by the cell?**

Ans: A cell is the smallest structural and functional unit of an organism. The cell performs certain functions such as nutrition, transport, excretion and reproduction.

2. **What does the cell needs to perform its various functions?**

Ans: The cell needs energy to perform its various functions.

3. **From where does the cell gets energy? How does this energy is release from the food?**

Ans: The cell gets energy from food. This energy is release during respiration.

4. **Why do all living organism respire?**

Ans: All living organisms respire to get energy from food.

5. **What is respiration?**

Ans: Respiration is defined as the bio-chemical process where in the living cells of an organism produce energy by taking in Oxygen and liberating Carbon dioxide.

6. **What is cellular respiration?**

Ans: Cellular respiration is the process of breakdown of food in the cell with the release of energy.

7. **Where does cellular respiration takes place?**

Ans: Cellular respiration takes place in the cells of all organisms.

8. **How many types of cellular respiration are there? Name them.**

Ans: There are two types of cellular respiration. They are i) aerobic respiration and ii) anaerobic respiration.

9. **What is aerobic respiration?**

Ans: The process of cellular respiration in which breakdown of glucose occurs in presence of oxygen is called aerobic respiration. In this process food (glucose) is broken down into carbon dioxide, water and energy. E.g.- Human cell

$$\text{Glucose} \xrightarrow{\text{In the presence of oxygen}} \text{carbon dioxide + water + energy}$$

10. What is anaerobic respiration?

Ans: The process of cellular respiration in which breakdown of glucose occurs in absence of oxygen is called anaerobic respiration. In this process food (glucose) is broken down into alcohol, carbon dioxide and energy. E.g. Yeast

$$\text{Glucose} \xrightarrow{\text{In the absence of oxygen}} \text{alcohol + carbon dioxide + energy}$$

11. What is the chemical substance formed in the anaerobic respiration in muscle?

Ans: Lactic acid.

12. Why do you get muscle cramps after heavy exercise?

Ans: The muscle cramps occur when muscle cells respire anaerobically. The partial breakdown of glucose produces lactic acid. The accumulation of lactic acid causes muscle cramps.

13. What is breathing?

Ans: Breathing means taking in air rich in oxygen and giving out air rich in carbon dioxde with the help of respiratory organs.

14. What are the two major steps of breathing?

Ans: The two major steps of breathing are:

i) Inhalation: It is the process of taking in of air rich in oxygen into the body.
ii) Exhalation: It is the giving out of air rich in carbon dioxide.

15. What is breathing rate?

Ans: Breathing rate is the number of times a person breathes in a minute.

16. Name the various organs found in our respiratory tract?

Ans: Various organs found in our respiratory tract are nasal passages, Oral cavity, pharynx, trachea (wind pipe), chest cavity, lungs, ribs and diaphragm.

17. Explain the respiratory system in human with a well labelled diagram.

Ans: When we inhale air it passes through our nostrils into the nasal cavity. From there the air reaches our lungs through the wind pipe. Lungs are present in the chest cavity. This cavity is surrounded by ribs on the sides. A large muscular sheet call diaphragm forms the floor of the chest cavity. Breathing involves the movement of the diaphragm and the rib cage. During inhalation, ribs move up and outwards, and diaphragm moves down. This movement increases space in our chest cavity and air rushes into the lungs. The lungs get filled with air. During exhalation, ribs move down and inwards, while diaphragm moves up to its former position. This reduces

the size of the chest cavity and air is push out of the lungs. This is how respiration takes place in the human body.

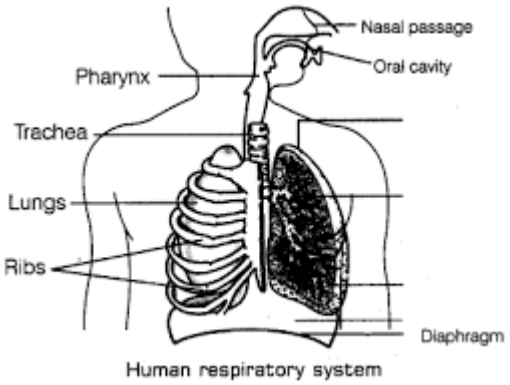


Fig: Human respiratory system

18. Demonstrate that Carbon dioxide is produce during respiration?

Ans: Take a slender, clean test tube. Make a hole in the lid and fix it on the bottle. Pour some freshly prepared lime water in the test tube. Insert a plastic straw through the hole in the lid in such a way that it dips in the lime water. Now blow gently through the straw a few times. The lime water becomes milky. This is because of Carbon dioxide present in the air blown.

Thus, this activity shows that carbon dioxide is produce during respiration.

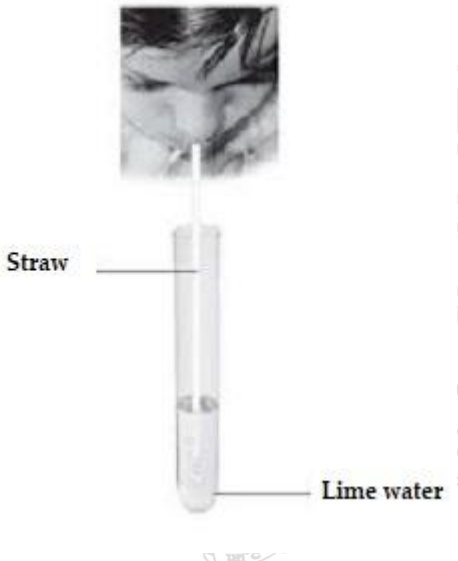


Fig: Effect of exhaled air on lime water

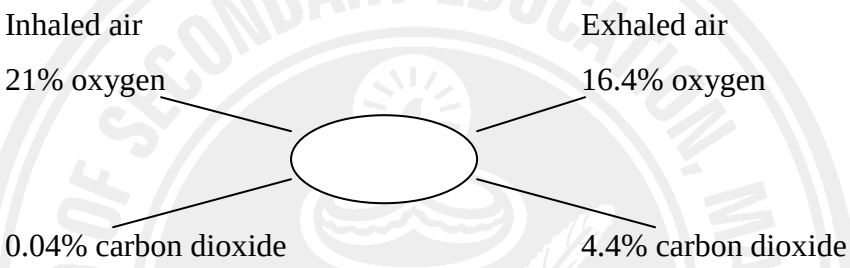
19. Differentiate between cellular respiration and breathing.

Ans:

Cellular Respiration	Breathing
1. This is a bio-chemical process	1. This is a physical process
2. In this type breakdown of food takes place.	2. In this type only inhalation and exhalation takes place.
3. It releases energy	3. It doesn't release energy.
4. It produces carbon dioxide	4. Here carbon dioxide is given out of the body and oxygen is taken in from the air.
5. It is an intracellular process	5. It is an extracellular process.

20. What is the percentage of oxygen and carbon dioxide in inhaled and exhaled air?

Ans: The percentage of oxygen and carbon dioxide in inhaled and exhaled air.



21. Explain the respiratory system in cockroach.

Ans: A small opening is present on the side of a cockroach body. This is called spiracles. For gas exchange insects have a network of air tubes called tracheae. Oxygen rich air rushes through spiracles into the tracheal tubes diffuses into the body tissues and reaches every cell of the body. Similarly, carbon dioxide from the cell goes into the tracheal tubes and moves out through spiracles. These air tubes or tracheae are found only in insects.

22. Write the respiration of:

i) Fish ii) Earthworm iii) Frog

Ans: i) Respiration in Fishes: Fishes live in water. They have gills which help in respiration. Gills separate oxygen from water. Gills are projections of skin.

ii) Respiration in earthworm: The earthworms breathe through their skin. The skin of earthworm feels moist and slimy on touching. Gases can easily pass through them.

iii) Like human beings, frogs have a pair of lungs. Frogs breathe through their skin, which is moist and slippery.

23. Do the plants also respire? How

Ans: Yes, plants also respire like other organisms.

Plants take in oxygen from the air and give out carbon dioxide. In the cells oxygen is used to break down glucose into carbon dioxide and water. In plants each part can independently take in oxygen from the air and give out carbon dioxide.