

GASEOUS EXCHANGE

1. a) - Air enter into tracheal system through spiracles
 - It moves onto the tracheoles then moves on to the tips of tracheoles.
 - Air rich in oxygen dissolves in a fluid at the tip of the tracheoles. There is low concentration of oxygen in tissues as compared to the fluid.
 - Oxygen diffuses into the tissues due to concentration gradient. It is used in metabolic activities.
 - In tissues there is high carbon dioxide concentration than in the fluid in tracheoles.
 - Carbon dioxide diffuses from tissues into tracheole due to concentration gradient. It moves into trachea then out of the body through spiracles.
- b) - Water enters through the mouth when it opens its mouth. When it closes the floor is raised and water flows over the gills.
 - Oxygen diffuses into the gills blood capillaries while carbon dioxide diffuses from the blood capillaries along concentration gradient.
 - Flow of water and blood in gill filaments is by counter current flow.
2. a) - Large number of alveoli-increase surface area.
 - Alveoli moist-dissolve diffusing gases.
 - This walls- allow quick diffusion of gases
 - Rich blood supply- transport oxygen and carbon dioxide.
- b) i) Carbon dioxide diffuses into the cells. It moves in the plasma or

red blood cells.

- Carbonic acid in plasma or carbamino haemoglobin in red blood cells or hydrogen carbonate.

- At the lungs hydrogen carbonate, carbonic acid and carbomino haemoglobin dissociates releasing cavity due to concentration gradient.

ii) Due to metabolic activities carbon dioxide is released from mesophyll cell. It diffuses into the intercellular spaces.

1. Due to concentration gradient the gas diffuses into the sub-stomatal air spaces.
2. When stomata open carbon dioxide is released into the atmosphere.

3. a) Carbon dioxide diffuses into the tracheoles then into the trachea and out into the atmosphere through spiracles.

- b)
- Stomata.
 - Lenticels
 - Cuticle

4. - To facilitate transportation of gases/exchange of gases i.e. oxygen and carbon dioxide.

- Create high concentration gradient.

- 5 a)
 - External intercostals muscle contract while internal intercostals muscles relax.
 - Diaphragm contract flattening. Volume in thoracic cavity
 - Air rushes into the lungs.

b) Opening During the day photosynthesis takes place and sugar is formed in guard cells

- Osmotic pressure increases and water is drawn from neighbouring

cells by Osmosis.

- The guard cells become turgid, bulge outward causing opening of stomata.

Closing During the night there is no photosynthesis and sugar is converted to starch.

- Osmotic pressure decrease and water is lost to the neighbouring cell osmosis.
- Guard cells become flaccid, closing the stomata.

6. - Stomata

 - Lenticels

 - Cuticle

7. - High number of stomata on the upper surface of the leaf.

 - Absence of cuticle to allow diffusion of carbon dioxide and oxygen.

8. a) - Pneumatophores

 - Aerenchyma tissues

 - Cuticle

 b) - The diaphragm flattens.

 - Volume in thoracic cavity increase.

 - Pressure decreases compared to atmospheric pressure. Air rushes into the lungs through the nostrils.

9. a) K- Pleural membranes

 L - Alveolus

 M- Intercostals muscles

 b) - Has c-shaped cartilage rings that support it, preventing it from

collapsing and allow free flow of air.

- Inner lining has mucus secreting cells that trap fine dust particles and micro-organisms.

- Inner lining has hair like structures called cilia that enhance upward movement of the mucus to the larynx.

c) Diffusion

d) Mycobacterium tuberculosis

10 - Highly folded to increase surface area.

- High network of blood capillaries

- Thin walled

- Moist

11. The trachea are strengthened by rings of cartilage which prevent them from collapsing.

12. - The epidermis of the root hair cells do not have cuticle and gaseous exchange takes place.

- When soil is water logged oxygen cannot diffuse into the root tissues hence no respiration. Metabolic activities stop leading to death.

13. - Air is cleaned by the cilia in nostrils

- Controlled amount of air is taken in through nose

- Individual is able to detect the smell of air breathed in.

14. - Spongy mesophyll cells are loosely packed allowing diffusion of gases.

- Spongy mesophyll cells have a film of moisture on the surface to dissolve diffusing gases.

- Large sub-stomatal air space in order to create high concentration gradient of diffusing gases.

- Presence of stomata where gases enter or leave the leaf.
15. - Carbon dioxide
- Water vapour
 - Oxygen
16. - Skin
- Mouth
17. - Mammals –alveoli
- Fish – gill filaments
 - Leaves – spongy mesophyll cells
 - Amoeba – cells membrane
18. Diffusion
19. Support the trachea and prevent it from collapsing when there is reduced pressure.