

## 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.
      - Due to concentration gradient the gas diffuses into the sub-stomatal air spaces.
      - 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- Pleaural 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.