

## 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- 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.

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