

RESPIRATION

Key Points

Respiration is the process by which the food taken through nutrition gets oxidized to release energy for various activities.

Types of Respiration

Aerobic Respiration

O₂ required

Occurs in Cytoplasm and mitochondria

Complete breakdown of glucose takes place

End Products- CO₂ and H₂O

38 ATP
Energy Produce

Anaerobic Respiration

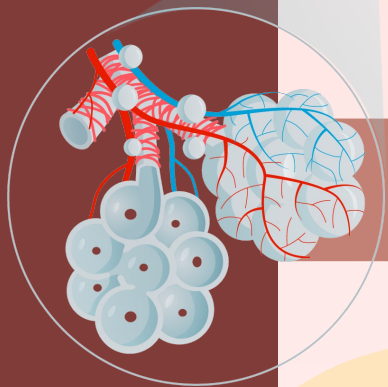
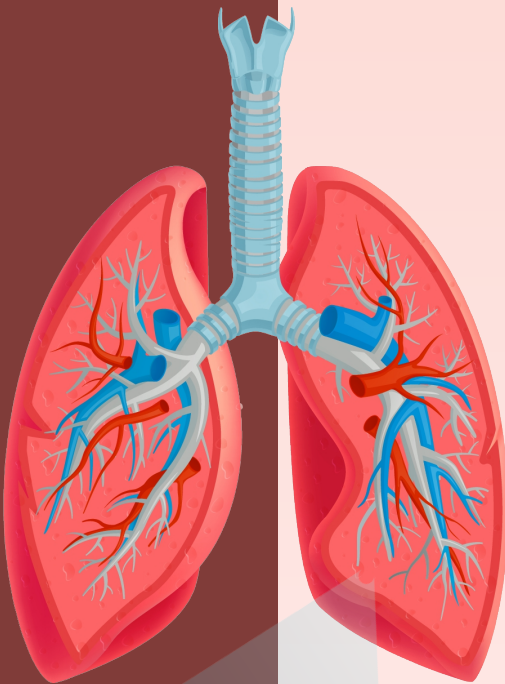
O₂ not required

Occurs in Cytoplasm only

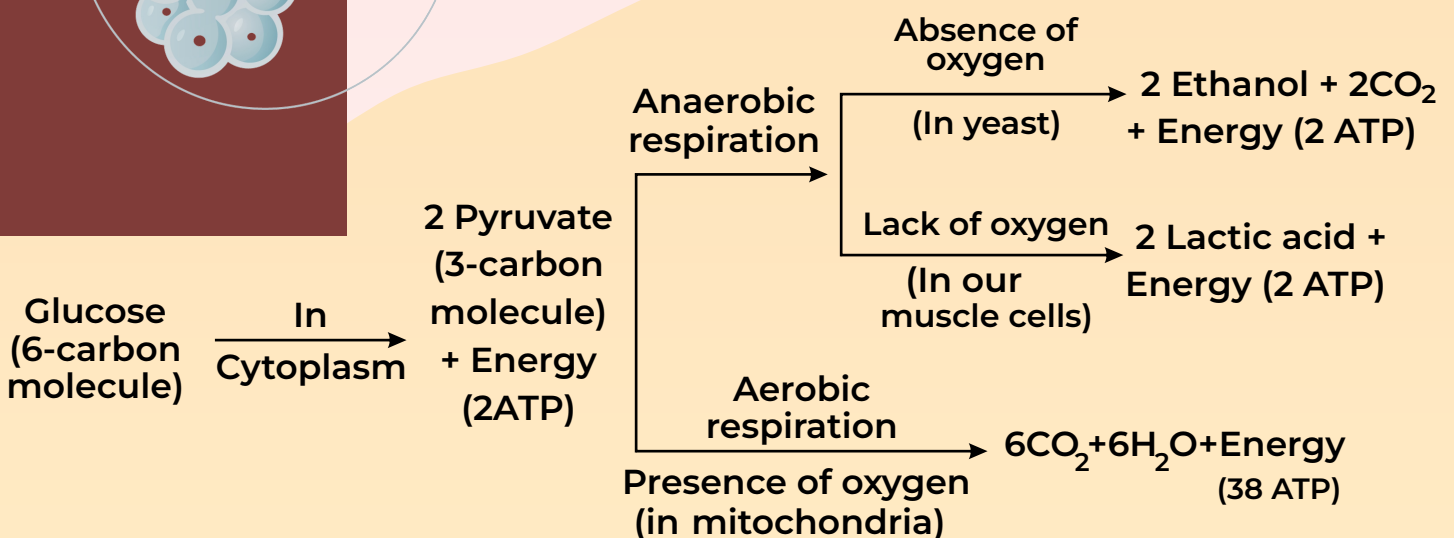
Incomplete breakdown of glucose takes place

End Products- CO₂ and ethyl alcohol or lactic acid

2 ATP
Energy Produce



Different ways in which glucose is oxidised to provide Energy in various organisms



Most common respiratory substrate is glucose.
First step in respiration is glycolysis common in aerobic and anaerobic respiration.

Gaseous Exchange in Plants

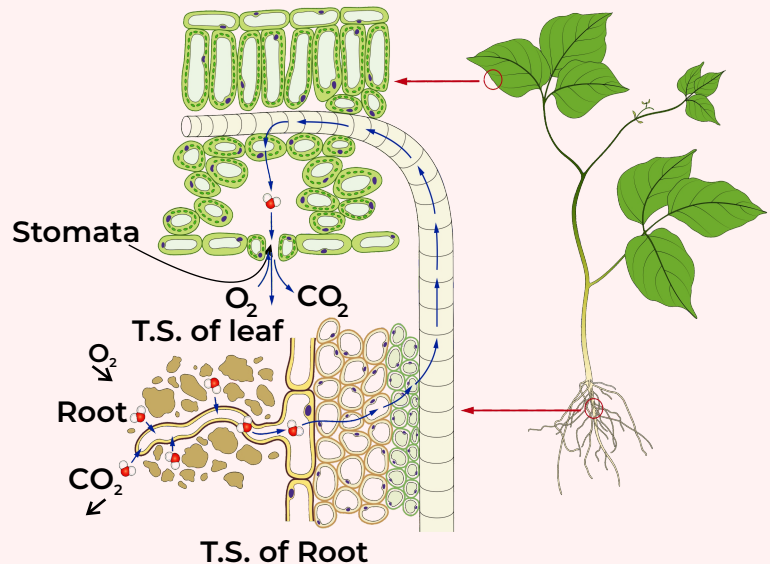
- » They do not have any special respiratory system so they have to respire through all of their individual parts like leaf, stem and root.
- » In terrestrial plants, gaseous exchange occurs through stomata, lenticles and root hairs.
- » Exchange gases with the atmosphere by simple diffusion.

Direction of diffusion depends upon

The environmental condition

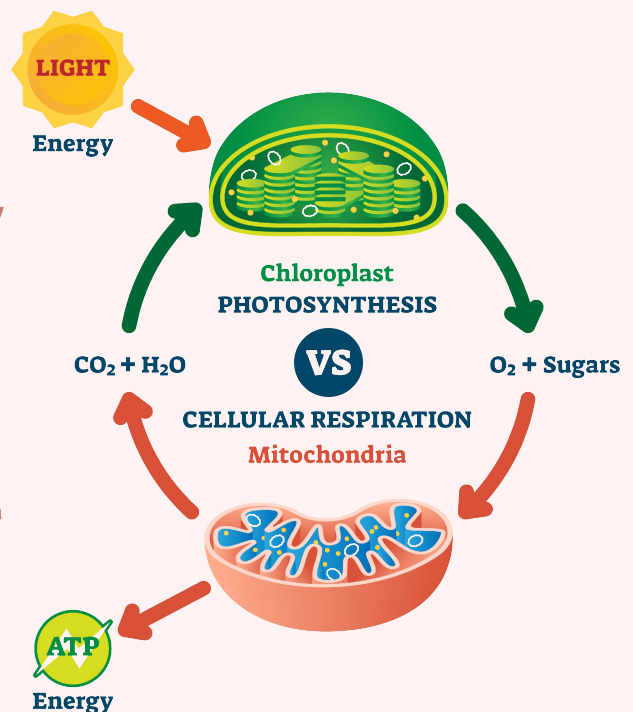
The requirement of the plant

Aquatic Plants : Gaseous exchange by diffusion over their whole surfaces.



Exchange of gases through stomata and root

Cyclic representation
of relation between
photosynthesis and
respiration



ATP = Adenosine
Tri Phosphate
1 ATP = 30.5 KJ/Mole
or 7.3 KCal/Mole

Events occur in plants during day and night

DURING DAY

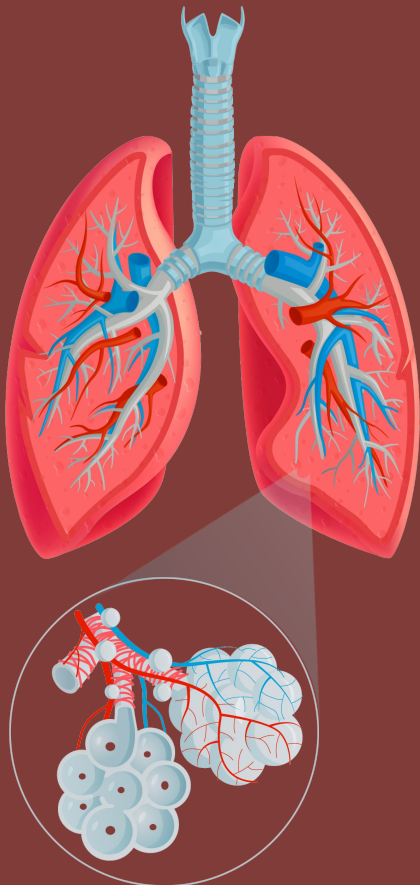
Rate of Photosynthesis is high than respiration.

O₂ release is the major event because CO₂ generated in respiration is used up for photosynthesis.

DURING NIGHT

No Photosynthesis.

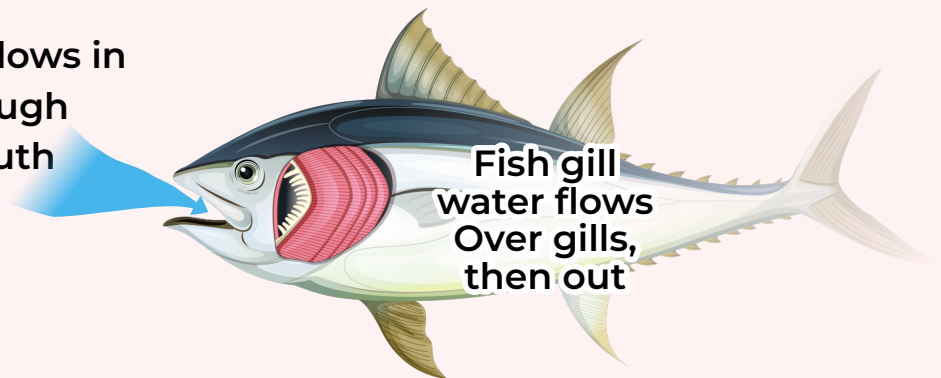
CO₂ elimination is the major event because CO₂ generated in respiration is not used in for photosynthesis.



Gaseous Exchange in Aquatic Animals

Fish takes dissolved oxygen from water. Breathing organs of fish are gills.

Water flows in through mouth



Fish gill water flows Over gills, then out

The rate of breathing

Aquatic organisms **>** Terrestrial organisms

Because water has low content of oxygen than air.

Gaseous Exchange in Terrestrial Animals

Animals have special organs for exchange of gases.



» Insects
(Cockroach and grasshopper)

- Tracheal Tubes (spiracles)

» Earthworms

- Moist Skin



» Human
(Rat, Lizard and Frog)

- Lungs



Respiratory system

1 A pair of external nostrils open into a pair of nasal passages.

Note

Epiglottis prevents the entry of food into respiratory tract.

2 The nasal passages are highly vascularized, have fine hairs and mucus secreting cells, so that the inspired air gets warmed, moistened and becomes dust free. The nasal cavities are separated from the oral cavity by a bony palate.

Note

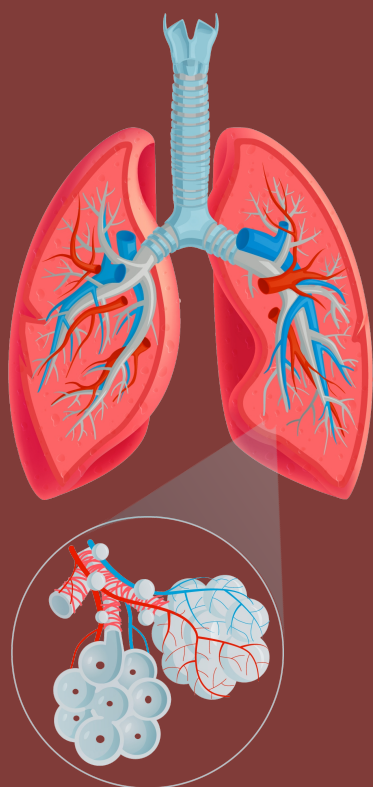
In our body the voice box called larynx is present. Two vocal cords are present inside the larynx. Vibration in the vocal cords results in production of sound by expired air.

3 The nasal chambers open into pharynx. The pharynx provides passage into trachea or wind pipe via larynx.

4 The wall of trachea has incomplete cartilaginous rings (C-shaped), which prevent the trachea from collapsing even if there is not much air in it.

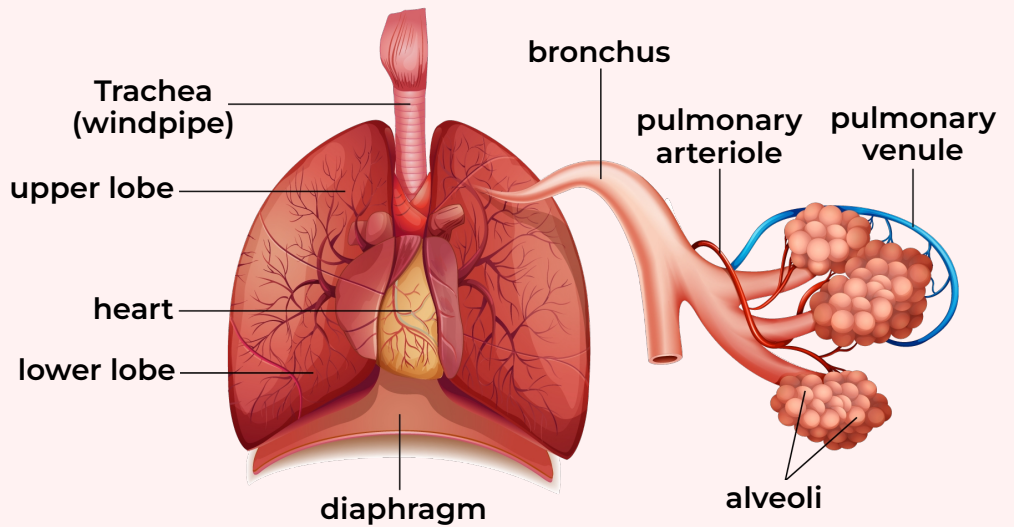
5 Trachea divides into bronchi (singular : bronchus). Each bronchus divides and redivides to form finer branches called bronchioles.

6 After repeated division of each bronchioles ends into alveoli.



Route of inhaled air

External nostrils → Nasal cavity → Pharynx → Larynx
→ Trachea → Bronchi → Bronchioles → Alveoli.

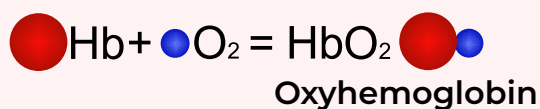
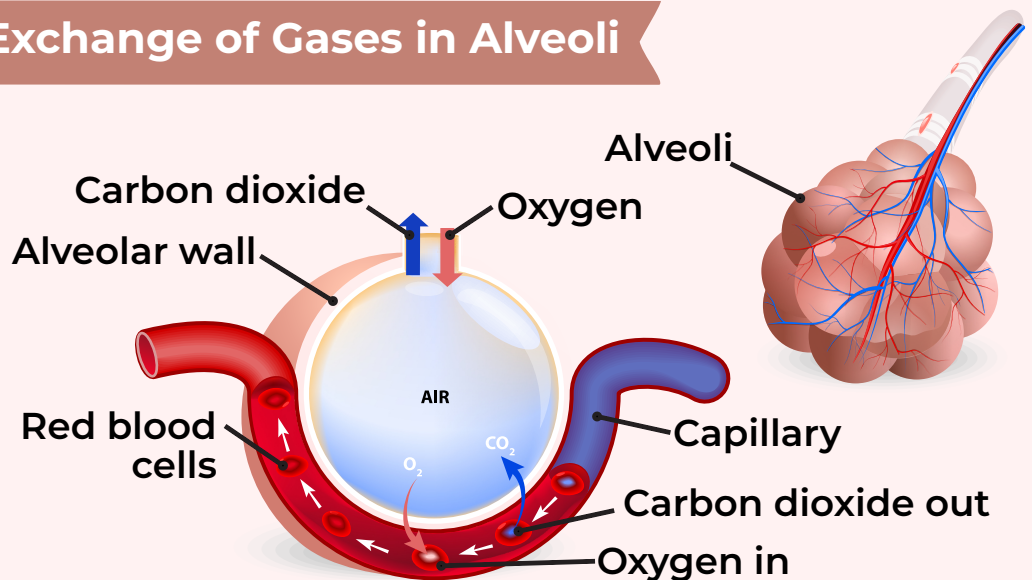


Human respiratory System

Lungs

The lungs are enclosed by a double layered membrane or covering called pleura. Alveoli are structural and functional units of lungs as these are the actual site of gaseous exchange.

Exchange of Gases in Alveoli



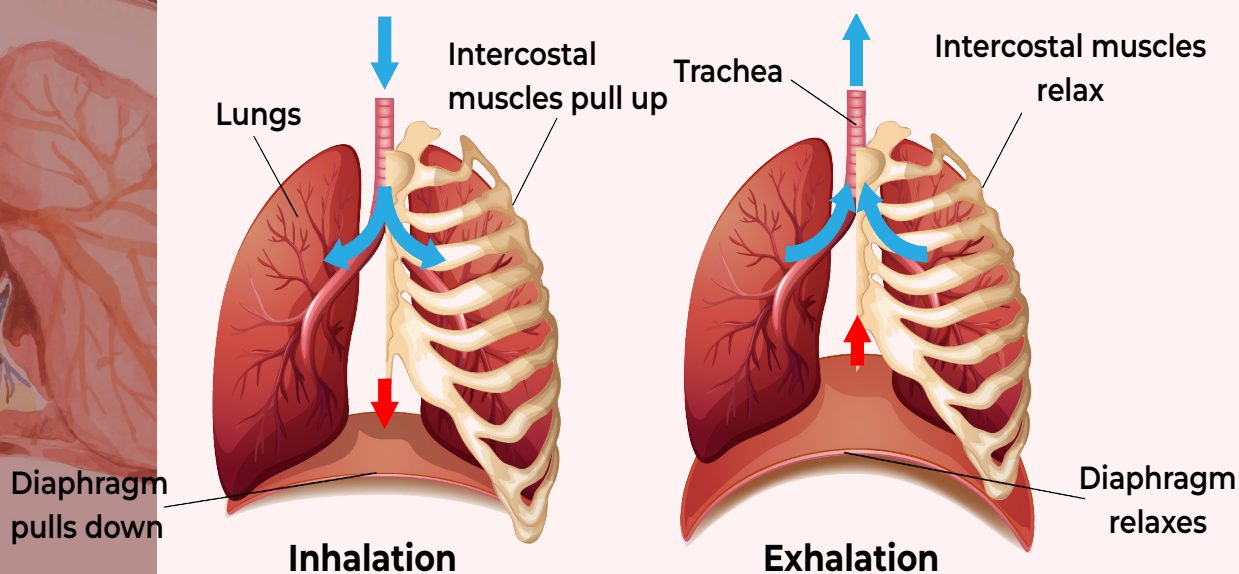
Arterial blood- bright red

- ◆ Haemoglobin is the respiratory pigment which is present in the red blood corpuscles (RBC).
- ◆ Haemoglobin has a very high affinity to oxygen.
- ◆ CO_2 is more soluble in water than oxygen hence CO_2 is mostly transported in the dissolved form in our blood.

Breathing

The stage of respiration during which air is inhaled into the lungs through the mouth or nose due to muscle contraction and then exhaled due to muscle relaxation is called breathing.

Mechanism of Breathing



Residual volume (RV) is the amount of air remaining in the lungs at the end of a maximum expiration.

Rate of breathing

- In children – 18-22/min
- In adolescents – 14-18/min
- In adult – 12-14/min

Note

CO_2 turns lime water milky.