Chapter: 10 "GASEOUS EXCHANGE" (plants & animals)

↳ in & out of air.

Plants	$\downarrow CO_2$	$O_2 \uparrow$
Animals	$\downarrow O_2$	$CO_2 \uparrow$

Respiration

* Differentiate b/w Breathing & Respiration.
* Differentiate b/w Aerobic & Anaerobic Respiration

* breakdown of glucose molecule.
* release of energy
* Happening all the time.
* Two types → Aerobic, Anaerobic

Reaction:-

$$C_6H_{12}O_6 + O_2 \longrightarrow CO_2 + H_2O + \text{Energy}$$

Breathing

* mechanical process
* in & out of air.
* Also called ventillation
* unit → alveoli
* What is gaseous exchange

Types of Respiration → Aerobic, Anaerobic

Aerobic respiration →
- presence of O_2
- large amount of energy is released
- Location: Mitochondria & Cytoplasm
- 36 ATP

Anaerobic respiration →
- absence of O_2
- Small amount of energy
- location: Cytoplasm
- 2 ATP

GASEOUS EXCHANGE IN PLANTS → photosynthesis, respiration.

* no proper mechanism for gaseous exchange.

organic molecule ↓ contain C-H bonds

Photosynthesis:

$$CO_2 + H_2O \xrightarrow[\text{Chlorophyll}]{\text{Sunlight}} \underset{\text{Glucose.}}{\overset{\text{organic molecule.}}{C_6H_{12}O_6}} + O_2 + H_2O$$

Respiration:

$$C_6H_{12}O_6 + O_2 \rightleftharpoons CO_2 + H_2O + \text{Energy}$$

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Diffusion → movement of molecules from higher conc. to lower conc.

conc. ↓ amount.

Day time: Plants ↓CO_2 Enivornment ↑

* Diffusion is main mechanism in all processes. → Stomata, Cuticle, lenticles.

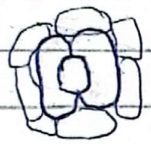
Stomata → tiny pores on lower surface of leaf.
↓ surrounded by guard cells

* Why is it important to regulate Stomatal opening & closing?

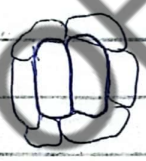
MCQs:-

(i) Identify the difference b/w these two diagrams.

(i)



(ii)



Answer:- fig-i is open stomata & fig-ii is closed stomata.

(ii) What are the cells surrounding Stomata?

Answer:- Guard cells surrounds stomata which are responsible for opening & closing of stomata.

* lenticles → pores on thick stem of old treers / bark.

* cuticle → waxy layer on upper epidermis

cuticle.

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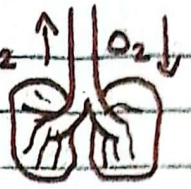
GASEOUS EXCHANGE IN MAN:



Air Passageway: → (route - pathway)
↳ area/route through which air has to move to reach lungs.

Components:-
Nose
↓
Pharynx
↓
Layranx
↓
Trachea
↓
Bronchioles
↓
Alveolar duct
↓
Alveloi

Nose:
- outer part → Nostril → Hair → to trap dust particle / purify or filtre the air.
- Goblet cells ↓ mucus → stick dust particles.
- Nerve cells → For sense of smell
- Cilia → sweep dust particles toward pharynx.

Pharynx:-
location:- at the back of mouth.
- common pathway for both food & air.

Lyranx:- → cartilagious structure.
- also called voice box.
- cavity of lyranx → glottis

Trachea:-
Tube like structure that extends from lyranx.
- connects pharynx → lungs
- C shaped cartilagious rings.

*What is the function of alveloi present inside lungs?

*Why is it necessary to breathe through nose rather than mouth?

MCQ:
- what is the actual site of gaseous exchange? alveloi
- Membrane present b/w lungs? Pleura.

Prepared by: Hafsa Sajjad Lecturer: Miss Rubina

LUNGS: two lungs, either side of heart.

protected by: • Ribs • Intercoastal Muscles

consists of → double membrane

↓

Pleura:

Structure & functional unit of lungs

↓

{alveloi}

fig: "alveloi"

BREATHING MECHANISM:

• when there is difference in pressure gradient inhalation & exhalation occurs.

- **inhalation** ↓ • movement of air inside the body
- **exhalation** ↓ • movement of air outside the body

*always movement occurs when there is conc/pressure gradient. (difference)

Intra pulmonary Pressure

↓

Pressure inside lungs.

FACTORS RESPONSIBLE FOR BREATHING:

(i) Pressure gradient (difference in pressure)

(ii) Contraction & Relaxation of muscles

* colliding of molecules of air.

↓

Atmospheric Pressure (760 mm/Hg)

Conditions:-

(i) Atmospheric Pressure = Intra pulmonary Pressure

(ii) Atmospheric Pressure > Intra pulmonary Pressure

(iii) Atmospheric Pressure < Intra pulmonary Pressure

In (i)

No movement of air in & out of lungs → At rest.

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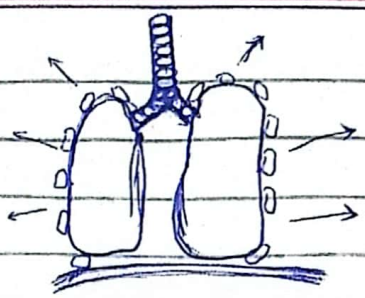
Inhalation:

→ Active Process {req. ATP}

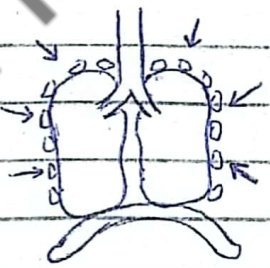


- medulla oblongata send signals to diaphragm & intercostal muscles.
- diaphragm → contract & move downward
- volume of lung increases.
- intercostal musles → contract & move upward.
- Pressure decreases.
- Ribcage contract & move upward.
- Air move inside lungs

In (ii)

Movement of air inside the lungs

Exalation: → reverse of inhalation.



- Diaphragm → relax & move upward
- Intercostal Muscles → relax & move ~~inward~~.
- Ribcage → relax & move downward
- Volume of lungs → decreases
- Pressure increases
- Air moves outside lungs

* Passive Process

↓

No need of ATP

In (iii)

Movement of air outside the lungs

QUESTION BANK: {SLOs}

- Differentiate b/w Respiration & Breathing.

BREATHING	RESPIRATION
Process	
voluntary	involuntary
Energy	
Energy is consumed	Energy is produced.
Type of action	
Endothermic	Exothermic
Function	
in & out of air – gaseous exchange.	production of energy
Location	
Extracellular – (i) Alveoli	Intracellular – (i) Mitochondria (ii) Cytoplasm

• Differentiate b/w Aerobic & Anaerobic respiration.

	Aerobic	Anaerobic
Def	Type of respiration which takes place in presence of O_2.	Type of respiration which takes place in absence of O_2
Energy	large amount of energy is released	small amount of energy released
ATP	36 ATP	2 ATP
Location	(i) Cytoplasm (ii) Mitochondria	(i) Cytoplasm
Steps	(i) Glycolysis (ii) Krebs's Cycle (iii) Electron Transport Chain	(i) Glycolysis (ii) Alcoholic Fermentation / Lactic Acid Fermentation.

• Why is it important to regulate stomatal opening & closing?

REGULATION OF STOMATAL OPENING & CLOSING:

It is important to regulate stomatal opening & closing to avoid excessive dehydration and have proper control and balance as transpiration (loss of H_2O from aerial part of leaves) is also taking place through stomata.

• Why is it necessary to breathe through nose rather than mouth?

BREATHING THROUGH NOSE RATHER THAN MOUTH:

Breathing through nose is better than breathing through mouth because it filters, humidifies & warms air, improving O_2 exchange, produces beneficial nitric oxide & support oral health and better sleep.