

LIFE PROCESSES

Class 10 Biology
RESPIRATION

PART 3/3

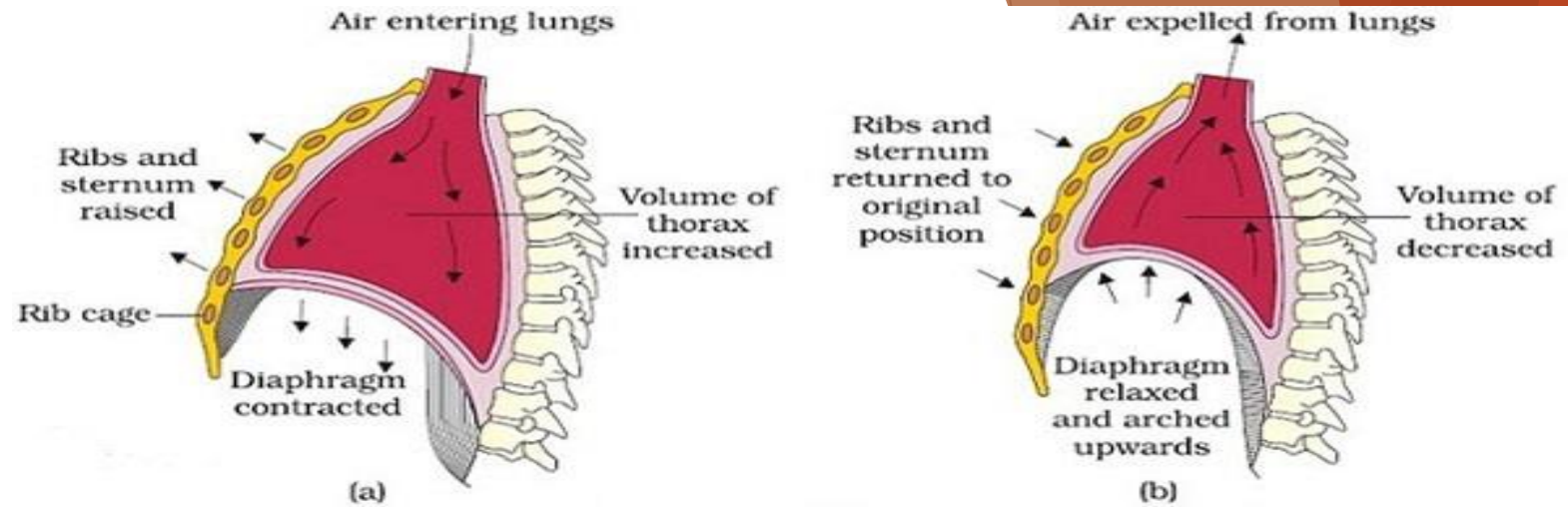


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MECHANISM OF BREATHING

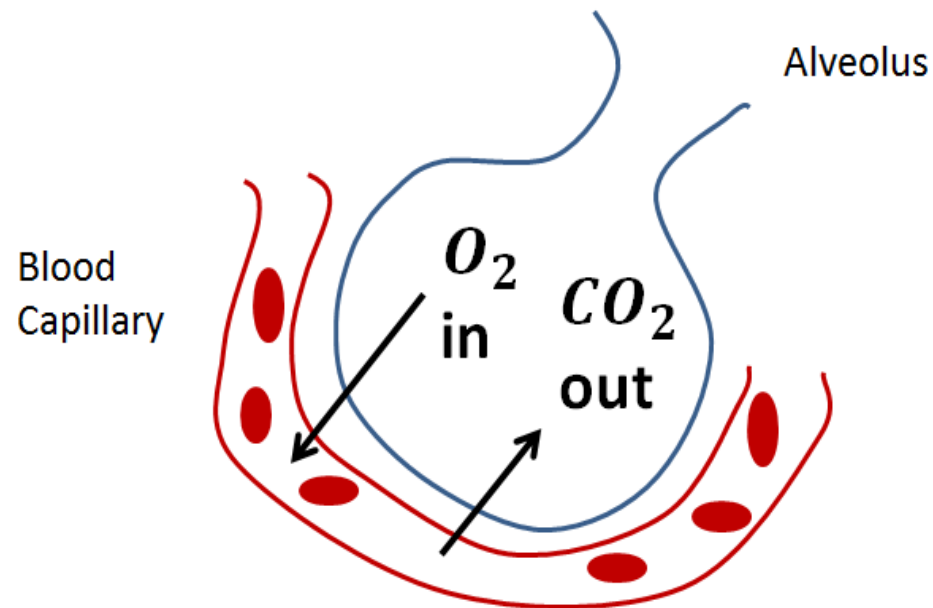


Mechanism of Breathing
a. Inspiration
b. Expiration

- Breathing is a physical process of taking in (inspiration or inhalation) and giving out (expiration or exhalation) air.
- When we take in air, our ribs are pulled up and out, the diaphragm contracts and flattens.
- This causes the chest cavity to become larger and so the volume in the lungs increases.
- The pressure in the lungs decreases and the air is sucked in through our nostrils and fills the alveolar sacs.
- Reverse happens when we breathe out. The ribs move in and down, returning to their original position, the diaphragm relaxes and moves back to the original dome shape.
- This reduces the volume of the lungs, thus increasing the pressure inside and the air is pushed/expelled out from the lungs.

EXCHANGE OF GASES IN HUMAN BEINGS:

- The air that enters the alveoli is rich in Oxygen. This oxygen is taken up by the blood in the alveolar vessels and sent to all the cells in the body.
- The carbon dioxide is brought by the blood from all parts of the body and released into the alveoli to be exhaled again.
- In the alveoli the exchange of gases takes place quickly across the concentration gradient.
- During the breathing cycle, when air is exhaled and inhaled, there is always a residual volume of air in the lungs. This is so that there is sufficient time for maximum oxygen to be absorbed and for the carbon dioxide to be released.



RESPIRATORY PIGMENT:

Haemoglobin and Oxygen

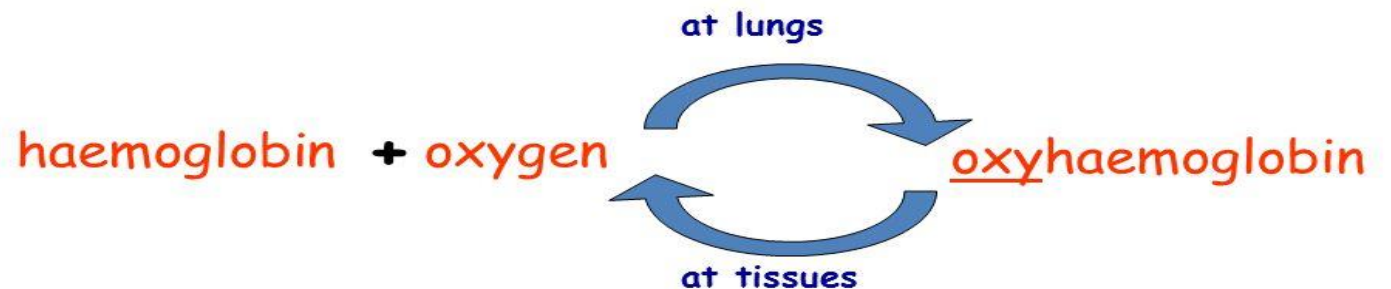
- Diffusion is the answer to exchange of gases and other materials in unicellular organisms.
- When the size of animals is large, diffusion alone cannot deliver oxygen to all parts of the body.
- Instead, a respiratory pigment takes up oxygen from the air in the lungs and carries it to tissues which are deficient in oxygen before releasing it.
- Humans have the respiratory pigment called haemoglobin that is found in the Red Blood Corpuscles/Cells(RBC).
- Haemoglobin (Hb) has a high affinity for Oxygen and reversibly binds to the oxygen forming **Oxyhaemoglobin** in the alveolar air and transports it to all the body parts.

Haemoglobin

A red pigment called **haemoglobin** is found in red blood cells. Its function is to **combine with oxygen** to form **oxyhaemoglobin**.

At the **lungs**, haemoglobin combines with oxygen to make **oxyhaemoglobin**.

At the **tissues**, oxyhaemoglobin releases oxygen and becomes **haemoglobin** again.



Haemoglobin and carbon dioxide

Haemoglobin also brings back CO₂ from the body parts as **carbaminohaemoglobin** to the alveoli. This is removed from the body.

Carbon dioxide is more soluble in water than oxygen is and hence is mostly transported in the dissolved form in the plasma or it is also simply transported as bicarbonates.



Transport of CO₂

✦ **Carbon dioxide**

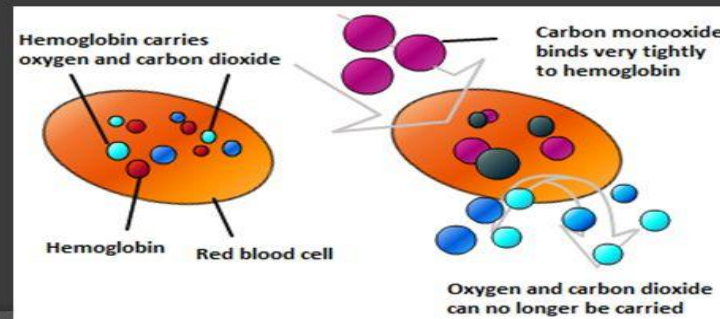
- ✦ transported from the body cells back to the lungs in three ways
 1. bicarbonate (HCO₃) - 70%
 2. carbaminohemoglobin - 23%
 3. dissolved in the plasma - 7%

HAEMOGLOBIN AND CARBON MONOXIDE:

- Haemoglobin combines about 210 times more readily and irreversibly with carbon monoxide(CO) as compared to oxygen. CO forms when fuel burns in insufficient supply of oxygen.
- CO is a colourless, odourless gas. It is dangerous when inhaled coming from motor vehicles, heaters etc. It is thus dangerous to sleep in a closed room with a small coal fire burning.
- If CO fumes are inhaled, they dissolve immediately through the alveoli into the blood, into the RBCs forming **Carboxyhaemoglobin** which is a super stable compound. The Haem will not release the CO.
- This decreases the oxygen carrying capacity of the blood.
- This is called carbon monoxide poisoning.

Carbon Monoxide

- Carbon monoxide **combine with haemoglobin** in red blood cells.
- This forms an **ultra-stable** compound called **carboxyhaemoglobin**.
- *This reduces the oxygen-carrying capacity of the blood.*
- Eventually, this will cause the body to detect low levels of oxygen in the blood, resulting in the heart rate going up.



Resources:

NCERT science text book for class 10

Google

THANK YOU