CBSE TEST PAPER-03

CLASS - XI BIOLOGY

(Breathing and Exchange of Gases)

General Instruction:

- All questions are compulsory.
- Question No. 1 to 3 carries one marks each. Question No. 4 to 6 carry two marks each. Question No. 7 and 8 carry three marks each. Question No. 9 carry five marks.

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1. Name the place where actual exchange of gases takes place in insects.

2. What is the percentage of O_2 in the inspired & expired air?

3. What is the utility of chloride shift?

4. What is the difference between carbaminohaemoglobin and oxyhaemoglobin?

5. What is functional residual capacity?

6. Describe the transport of O_2 and CO_2?

7. Define oxygen dissociation curve? Why it has a sigmoidal pattern?

8. What is the role of carbonic anhydrase? How does it facilitate the transport of CO_2 ?

9. Explain how our heart muscles get a continuous supply of atmospheric oxygen.

CBSE TEST PAPER-03

CLASS - XI BIOLOGY (Body fluids and circulation)

[ANSWERS]

Ans 01. Tracheoles.

Ans 02. Inspired air has 21% O_2 and expired air has 16% O_2.

Ans 03. It maintains the ionic balance and electrochemical neutrality.

Ans 04.

	Oxyhaemoglobin	Carbominohaemoglobin
1.	It is formed by the combination of oxygen with the Fe^{2+} part of haemoglobin.	It is formed by the combination of carbon dioxide with the amine radical of haemoglobin.
2.	It formation occurs on the alveolar surface.	Its formation occurs in the tissues.

Ans 05. The volume of air that will remain in the lungs after a normal expiration is known as the Functional Residual Capacity (FRC). It includes ERV+RV.

Ans 06.

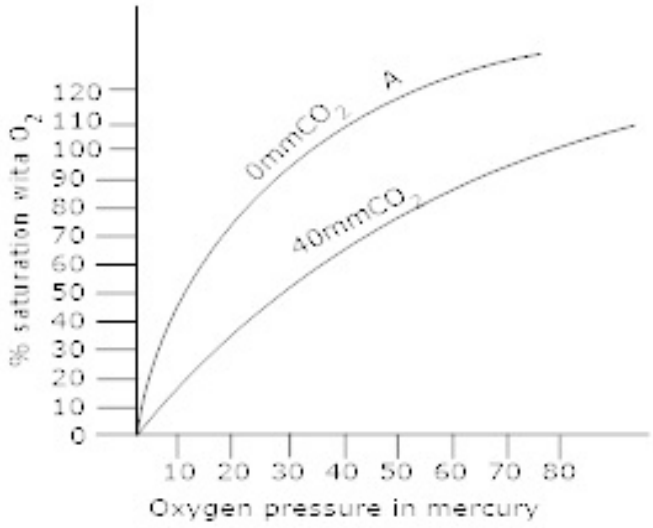
- O_2 is transported as oxyhaemoglobin. In the alveoli of lungs (high pO2, low pCO2, lesser H^+ concentration and lower temperature), these conditions are favourable for the formation of oxyhaemoglobin
- In tissues (low pO2, high pCO2, high H^+ concentration and higher temperature exist) these conditions are favourable for dissociation of oxygen from the oxyhaemoglobin.
- Every 100 ml of oxygenated blood can deliver around 5 ml of O2 to the tissues under normal physiological conditions.
- CO_2 is carried by haemoglobin as carbamino-haemoglobin (about 20-25 per cent). This binding depends on the partial pressure of CO_2, when pCO_2 is high and pO_2 is low as

in the tissues, more binding of carbon dioxide occurs whereas, when the pCO_2 is low and pO_2 is high as in the alveoli, dissociation of CO_2 from carbamino-haemoglobin takes place.

- Carbonic anhydrase enzyme also facilitates the transport of CO_2 in blood.
- Every 100 ml of deoxygenated blood delivers approximately 4 ml of CO2 to the alveoli.

Ans 07. The relationship between O_2 tension and its absorption by haemoglobin produces a graph called oxygen dissociation curve (O_2 equilibrium curve). At about 100 mm Hg O_2 tension Hb is 98% saturated (complete formation of haemoglobin). As it falls, the saturation of Hb decreases slowly. When O_2 tension is about 40mm Hg, oxyhaemoglobin dissociates and O_2 is available to the tissues.

The O_2 gets bound to Hb in lung surface and it gets dissociated at tissues.

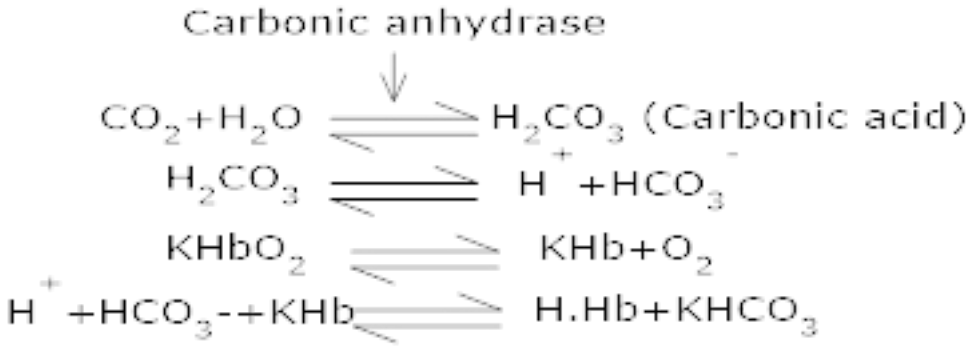


Ans 08.

- RBCs contain a very high concentration of the enzyme, carbonic anhydrase and minute quantities of the same is present in the plasma too.
- This enzyme facilitates the following reaction in both directions. At the tissue site where the pCO_2 is high due to catabolism, CO_2 diffuses into blood (RBCs and plasma) and forms HCO_3^- and H^+.
- At the alveolar site where pCO_2 is low, the reaction proceeds in the opposite direction leading to the formation of CO_2 and H_2O.
- Thus, CO_2 trapped as bicarbonate at the tissue level and transported to the alveoli is

released out as CO_2.

- Every 100 ml of deoxygenated blood delivers approximately 4 ml of CO2 to the alveoli



Ans 09. When inspiration occurs, the O_2 is taken into lungs. O_2 mixes with air already present in alveoli and becomes alveolar air, whose PO_2 is 100 m Hg.

As PO_2 of blood in the vessels is 40 mmHg oxygen differs into blood vessels from alveoli and the oxyhaemoglobin is formed when oxygen combines loosely with the Fe^{++} ions of haemoglobin.

Oxygenated blood from the lungs reaches the left auricle through the pulmonary vein; to the left ventricle is pumped at through aorta also.

The branch supplying blood to heart muscles is the coronary artery. In heart muscles, as the PO_2 is lower than that of the blood in the branches of the coronary artery, oxyhaemoglobin dissociates and releases O_2 to cardiac muscles.