8.2 Transport of Oxygen & Carbon Dioxide

Question Paper

Course	CIE A Level Biology (9700) exams from 2022
Section	8. Transport in Mammals
Topic	8.2 Transport of Oxygen & Carbon Dioxide
Difficulty	Medium

Time allowed: **10**

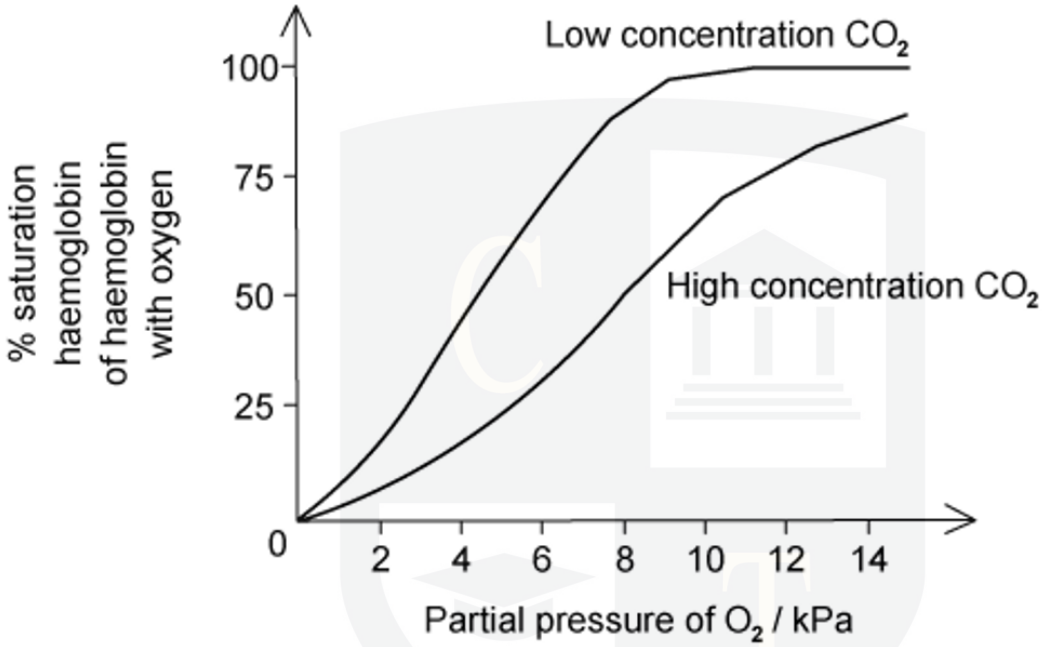
Score: **/10**

Percentage: **/100**

Question 1

The percentage saturation of haemoglobin with oxygen changes at different partial pressures of oxygen.

The graph below shows this change in two different concentrations of carbon dioxide.



What of the following would be a correct effect of increasing the carbon dioxide concentration?

A It increases the dissociation of oxygen from haemoglobin in respiring tissues.

B It increases the affinity of haemoglobin for oxygen at respiring tissues.

C It increases the inhibition of carbonic anhydrase enzyme in red blood cells.

D It increases the dissociation of haemoglobinic acid inside red blood cells.

[1 mark]

Question 2

Oxygen is displaced from oxyhaemoglobin.

Which of the following substances will encourage this displacement?

1 hydrogen ions

2 hydrogen carbonate ions

3 carbon monoxide

4 carbon dioxide

A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 2 and 4

[1 mark]

Question 3

When carbon dioxide levels increase in human blood, the oxyhaemoglobin dissociation curve shifts to the right.

Which of the following statements explains this effect?

A Diffusion of carbon dioxide between the alveoli and the blood is more rapid.

B Increasing the H^+ concentration decreases haemoglobin affinity for oxygen.

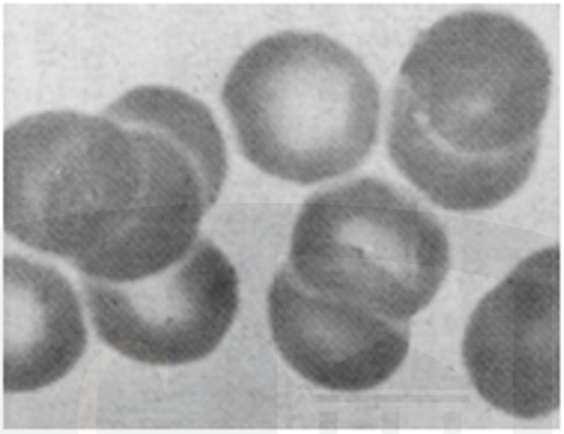
C Carbon dioxide is more soluble than oxygen and displaces it.

D An increase in carbon dioxide concentration increases the ventilation rate.

[1 mark]

Question 4

The photograph below shows a type of blood cell.



Which of the following statements about these cells are correct?

1 Water passes in and out of these cells by osmosis.

2 Oxygen diffuses through the phospholipid bilayer.

3 Sodium ions diffuse through the phospholipid bilayer.

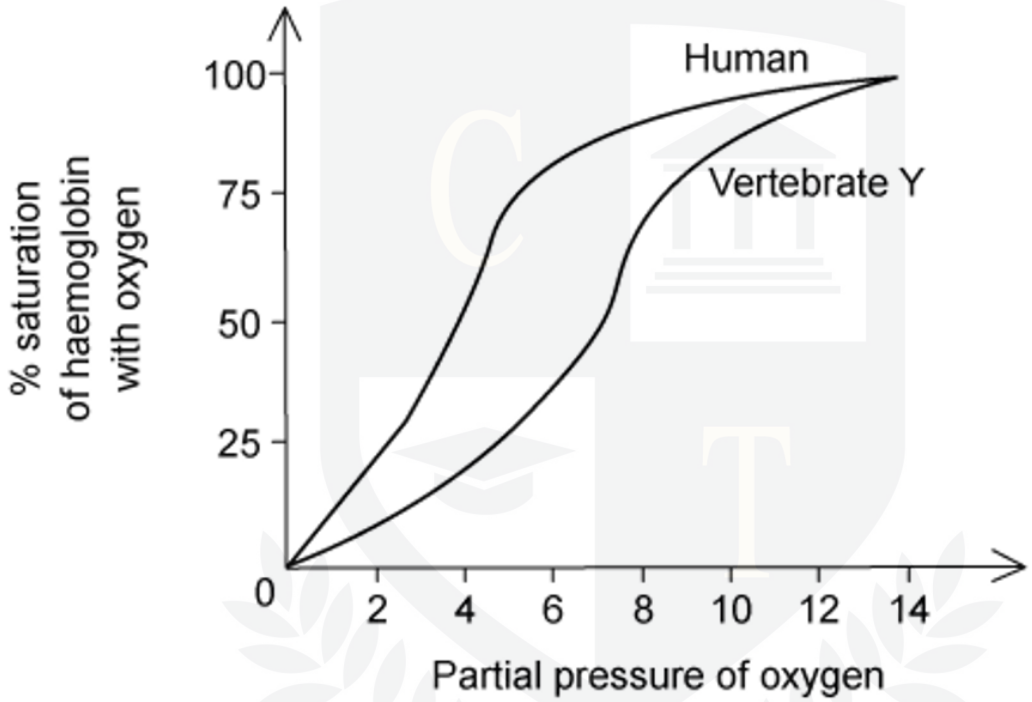
A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 1, 2 and 3

[1 mark]

Question 5

Different animals have differing percentage saturation of haemoglobin at the same partial pressures.

The graph below shows this difference between a human and vertebrate Y. The partial pressure of CO_2 remains constant at 1.0 kPa and the temperature constant at 25 ˚C.



Which of the following conclusions is supported by the data in the graph?

A Haemoglobin does not become fully saturated in the lungs of vertebrate **Y.**

B The Bohr effect in the haemoglobin of vertebrate **Y** is greater than in human haemoglobin.

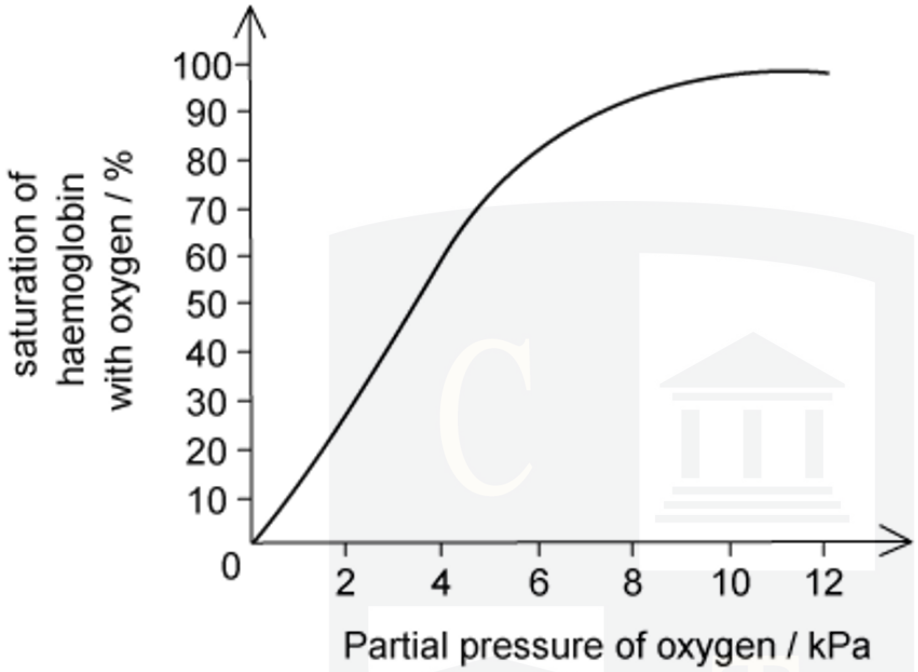
C Oxygen is more easily released from haemoglobin in the muscle of vertebrate **Y** than in human muscle.

D At the temperature of 25 °C the affinity of haemoglobin for oxygen increases more in humans than in vertebrate **Y**.

[1 mark]

Question 6

The graph below shows the oxygen dissociation curve for human haemoglobin.



What range of partial pressures of oxygen would be found in pulmonary arteries?

A from 0 to 2 kPa

B from 2 to 6 kPa

C from 6 to 8 kPa

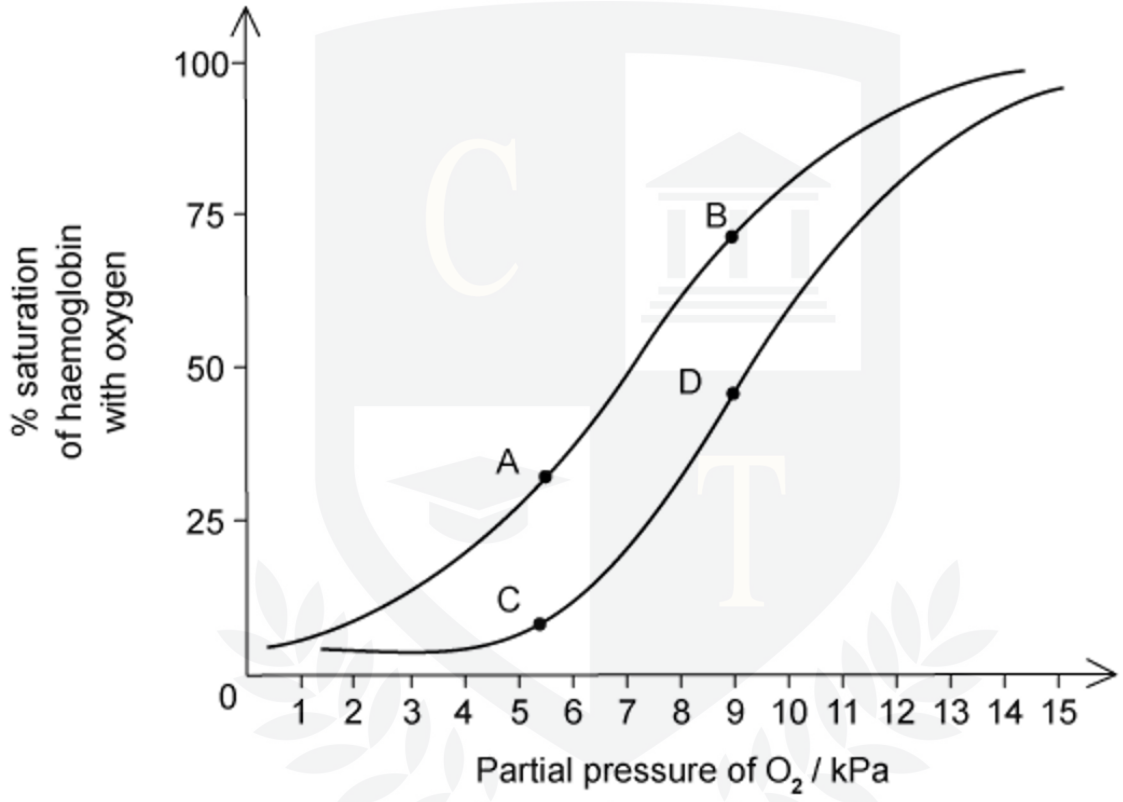
D from 8 to 12 kPa

[1 mark]

Question 7

The graph below is the oxygen dissociation curve for human haemoglobin in different concentrations of carbon dioxide.

Which letter represents the oxygen concentration of red blood cells as they leave a resting muscle?



[1 mark]

Question 8

The following are reactions that take place in blood.

1 $HbO_8 \rightarrow Hb + 4O_2$

2 $HbO_8 + H^+ \rightarrow HHb + 4O_2$

3 $HCO_3^- + H^+ \rightarrow H_2CO_3$

4 $H_2O + CO_2 \rightarrow H_2CO_3$

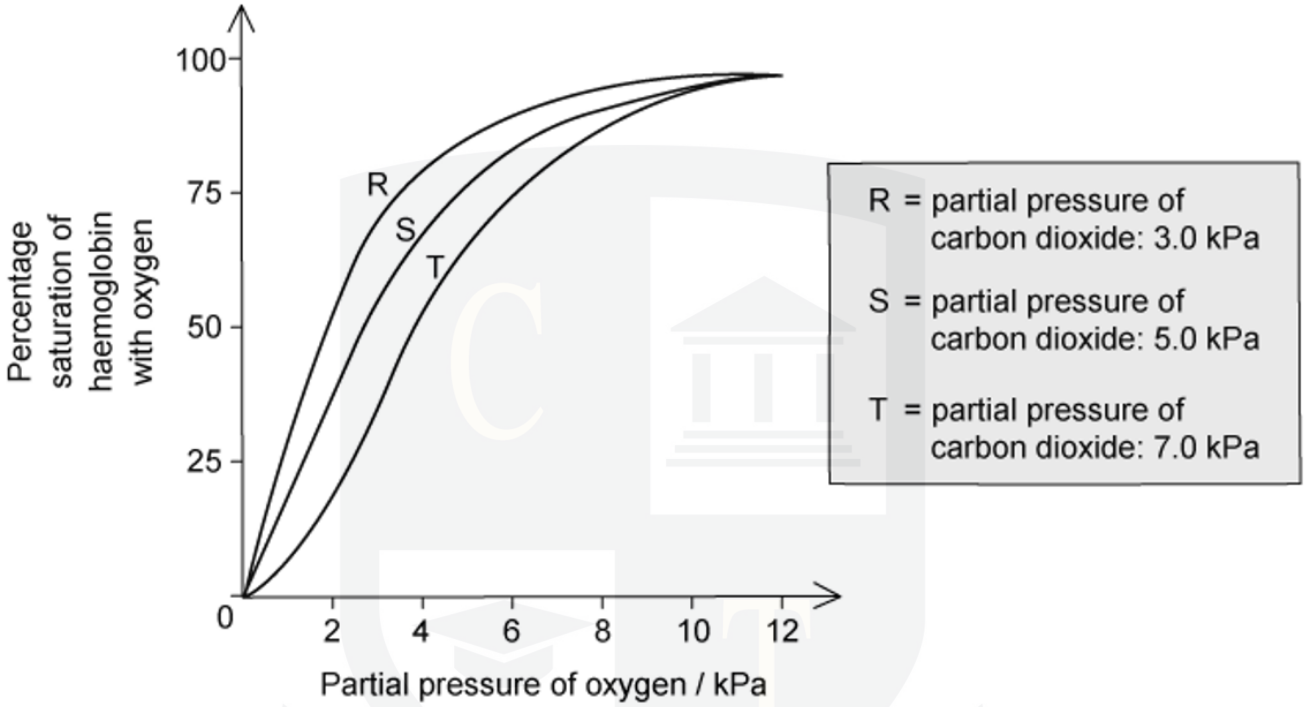
Which of these will take place in blood passing through active tissues?

A 1, 3 and 4 **B** 1, 2 and 3 **C** 2 and 3 **D** 1, 2 and 4

[1 mark]

Question 9

The graph shows the oxygen dissociation curves for human haemoglobin in three different concentrations of carbon dioxide.



What is the effect of carbon dioxide on haemoglobin?

A It makes it more efficient at taking up oxygen and also more efficient at releasing it.

B It makes it more efficient at taking up oxygen and less efficient at releasing it.

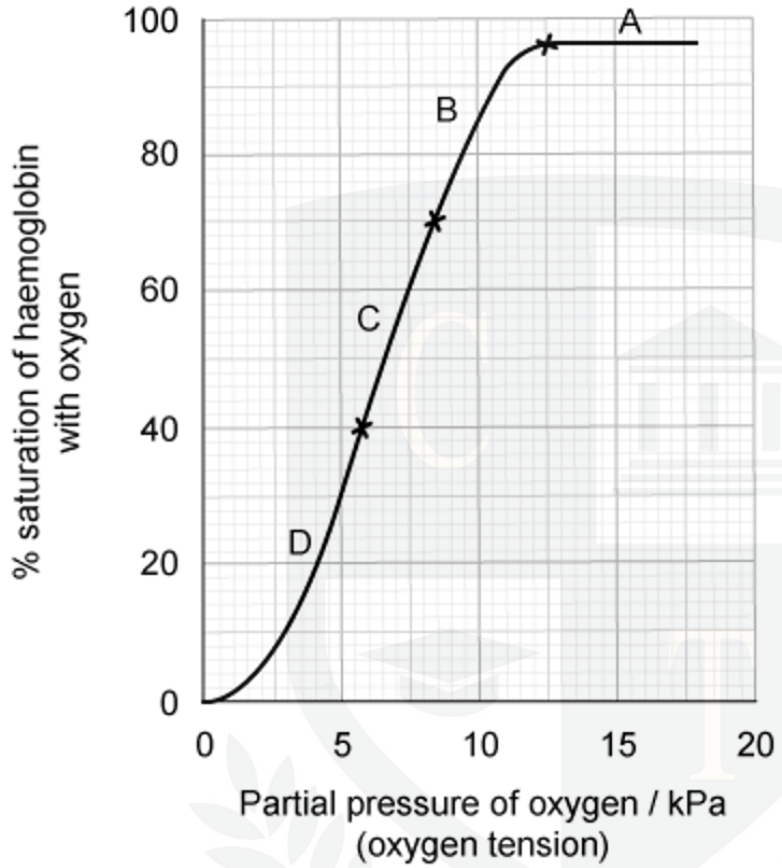
C It makes it less efficient at taking up oxygen and also less efficient at releasing it.

D It makes it less efficient at taking up oxygen and more efficient at releasing it.

[1 mark]

Question 10

The graph below shows the oxygen dissociation curves for human haemoglobin.



Which letter shows the range of partial pressures that produce the greatest change of percentage saturation of haemoglobin per oxygen unit tension?

[1 mark]