

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	Hard

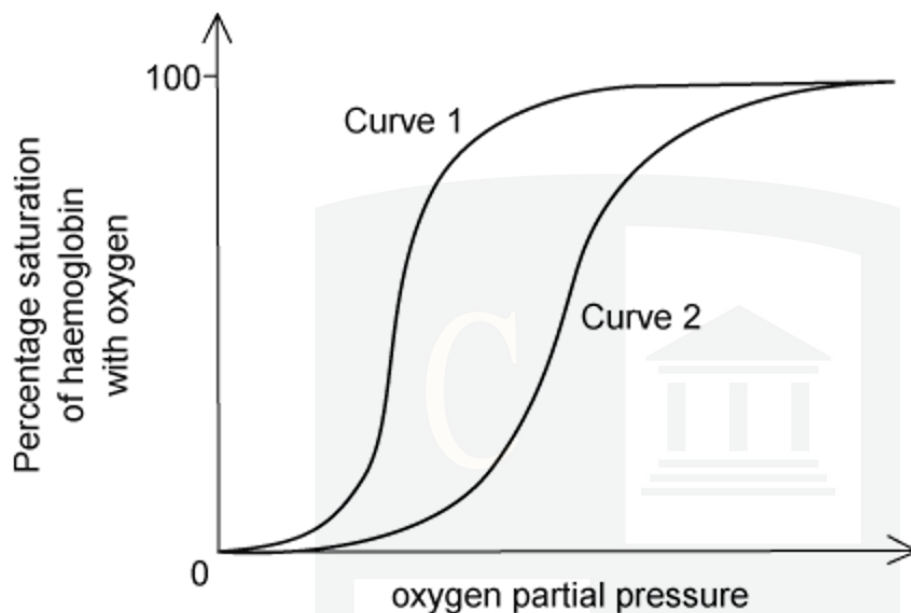
Time allowed: 10

Score: /10

Percentage: /100

Question 1

The graph shows the oxygen dissociation curves for human haemoglobin at two different pHs.



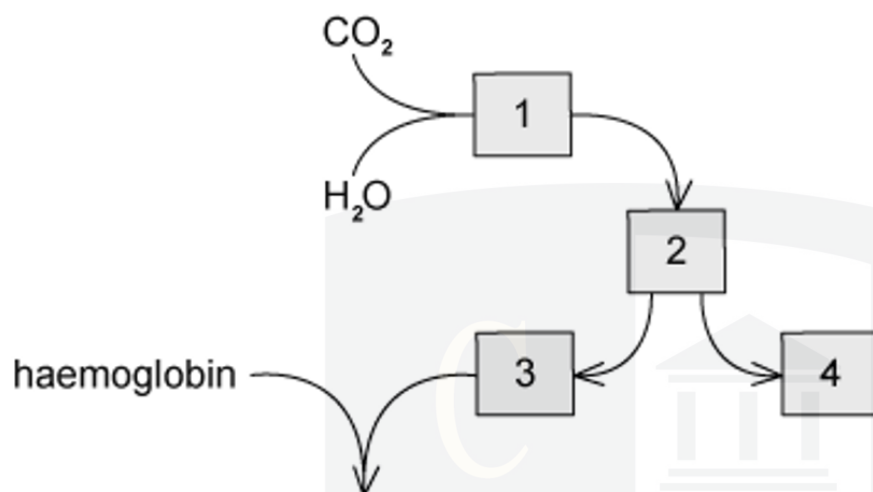
Which curve shows the lowest pH and in which tissue might have this data been collected?

	lower pH	Tissue
A	curve 2	active muscle
B	curve 2	resting muscle
C	curve 1	active muscle
D	curve 1	resting muscle

[1 mark]

Question 2

The diagram shows the transportation of carbon dioxide by red blood cells.



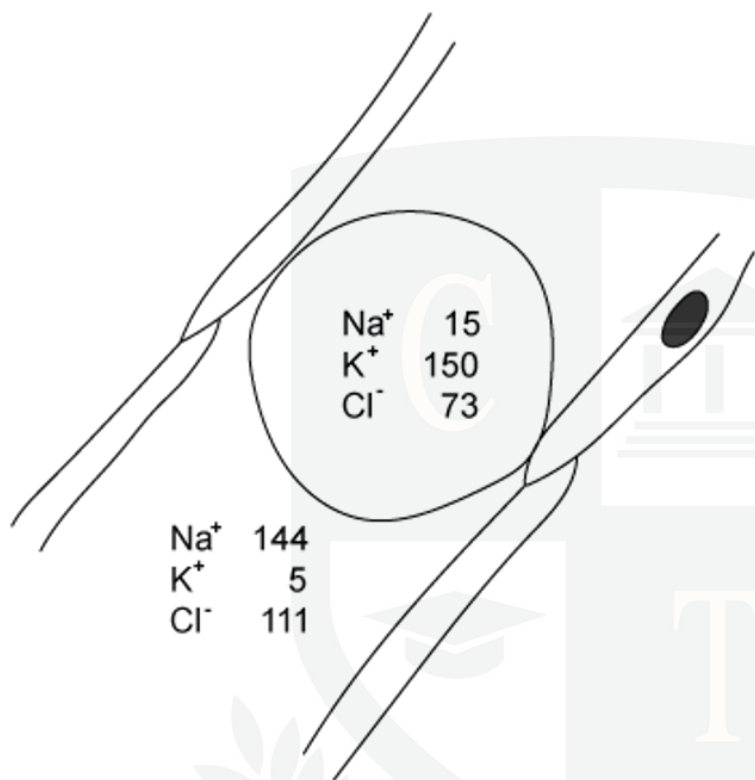
Which row shows the correct compounds at each stage?

	1	2	3	4
A	carbamino-haemoglobin	haemoglonic acid	hydrogen ions	hydrogen carbonate ions
B	carbonic anhydrase	carbonic acid	hydrogen carbonate ions	hydrogen ions
C	carbamino-haemoglobin	carbonic anhydrase	carbonic acid	carbon dioxide
D	carbonic anhydrase	carbonic acid	hydrogen ions	hydrogen carbonate ions

[1 mark]

Question 3

The diagram shows a red blood cell with the concentration of ions, in mmol dm^{-3} , inside and outside the cell.



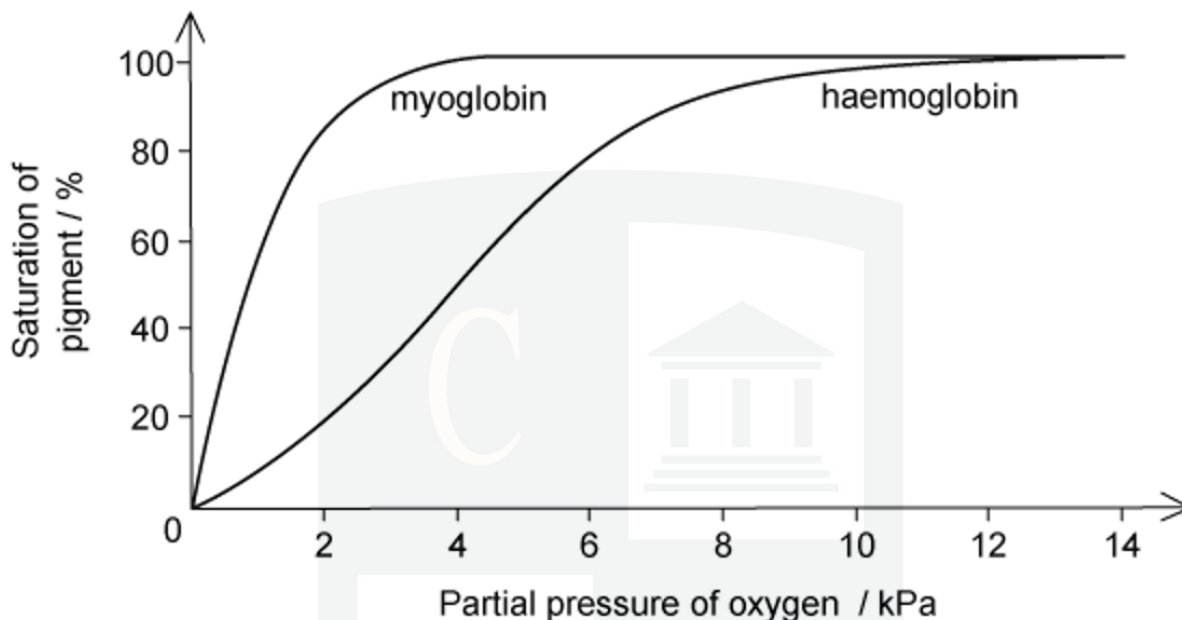
Which row shows the correct direction of active transport?

	into cell	out of cell
A	Cl^-	K^+
B	Na^+	Cl^-
C	Na^+	K^+
D	K^+	Na^+

[1 mark]

Question 4

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



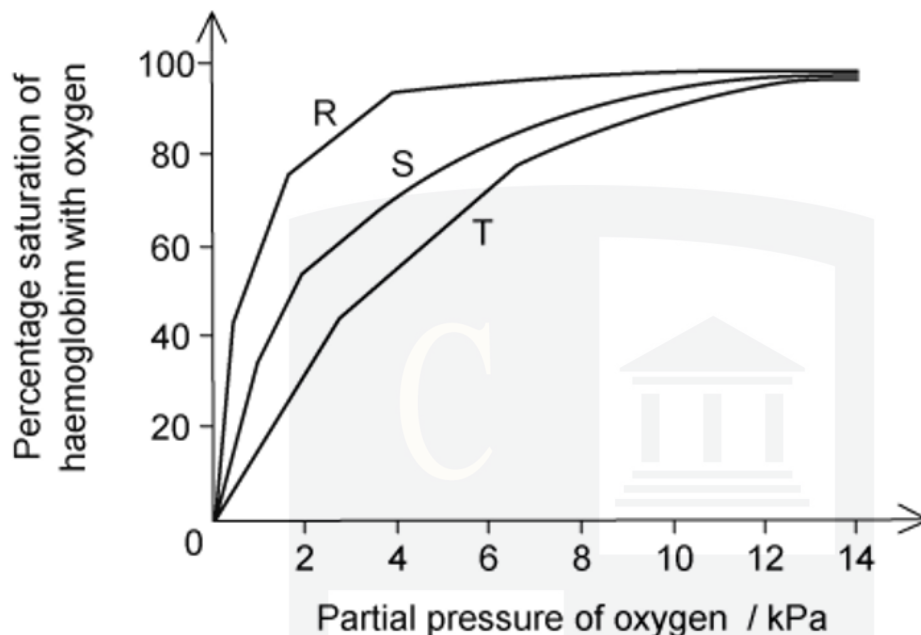
Which statement correctly compares myoglobin and haemoglobin at a partial pressure of oxygen of 2 kPa?

- A Haemoglobin has a lower affinity for oxygen than myoglobin.
- B Haemoglobin combines with more oxygen than myoglobin.
- C Haemoglobin has a saturation of 20% when myoglobin is fully saturated.
- D Haemoglobin combines with oxygen when myoglobin releases oxygen.

[1 mark]

Question 5

The graph below shows the oxygen dissociation curves for haemoglobin in three different animals.



Which of the haemoglobins **R**, **S** or **T** would be present in each of the animals shown in the list below?

- 1 An adult human.
- 2 A fish living in water that has a very low oxygen concentration.
- 3 A very active mammal whose tissues have a much higher rate of respiration than an adult human.

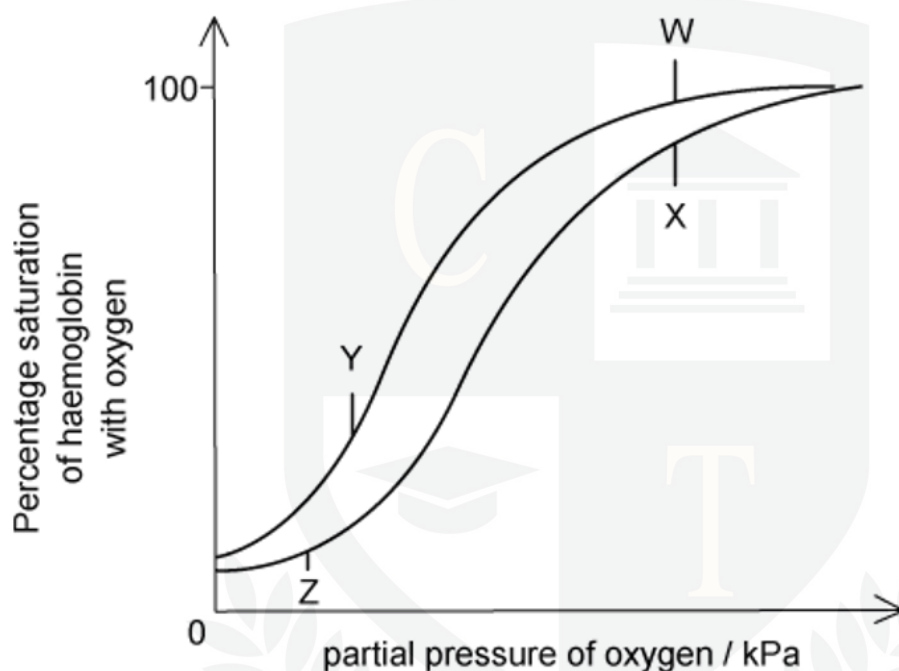
	1	2	3
A	T	S	R
B	S	T	R
C	S	R	T
D	R	S	T

[1 mark]

Question 6

Active muscles have a higher respiration rate than resting muscles. The graph below shows the oxygen dissociation curves for haemoglobin for resting muscle and active muscle.

- **W** and **X** are at the partial pressures of oxygen found in the lungs.
- **Y** and **Z** are at the partial pressures of oxygen found in either a resting muscle or an active muscle.



Which of the following statements are correct?

- 1 The % saturation at **X** minus the % saturation at **Y** represents the amount of oxygen delivered to a resting muscle.
- 2 The % saturation at **W** minus the % saturation at **X** represents the amount of oxygen delivered to an active muscle.
- 3 The % saturation at **X** represents the amount of oxygen carried to an active muscle.
- 4 The % saturation at **Z** represents the amount of oxygen required by a resting muscle.
- 5 The % saturation at **W** minus the % saturation at **Y** represents the amount oxygen delivered to a resting muscle

A 1 and 3

B 1 and 4

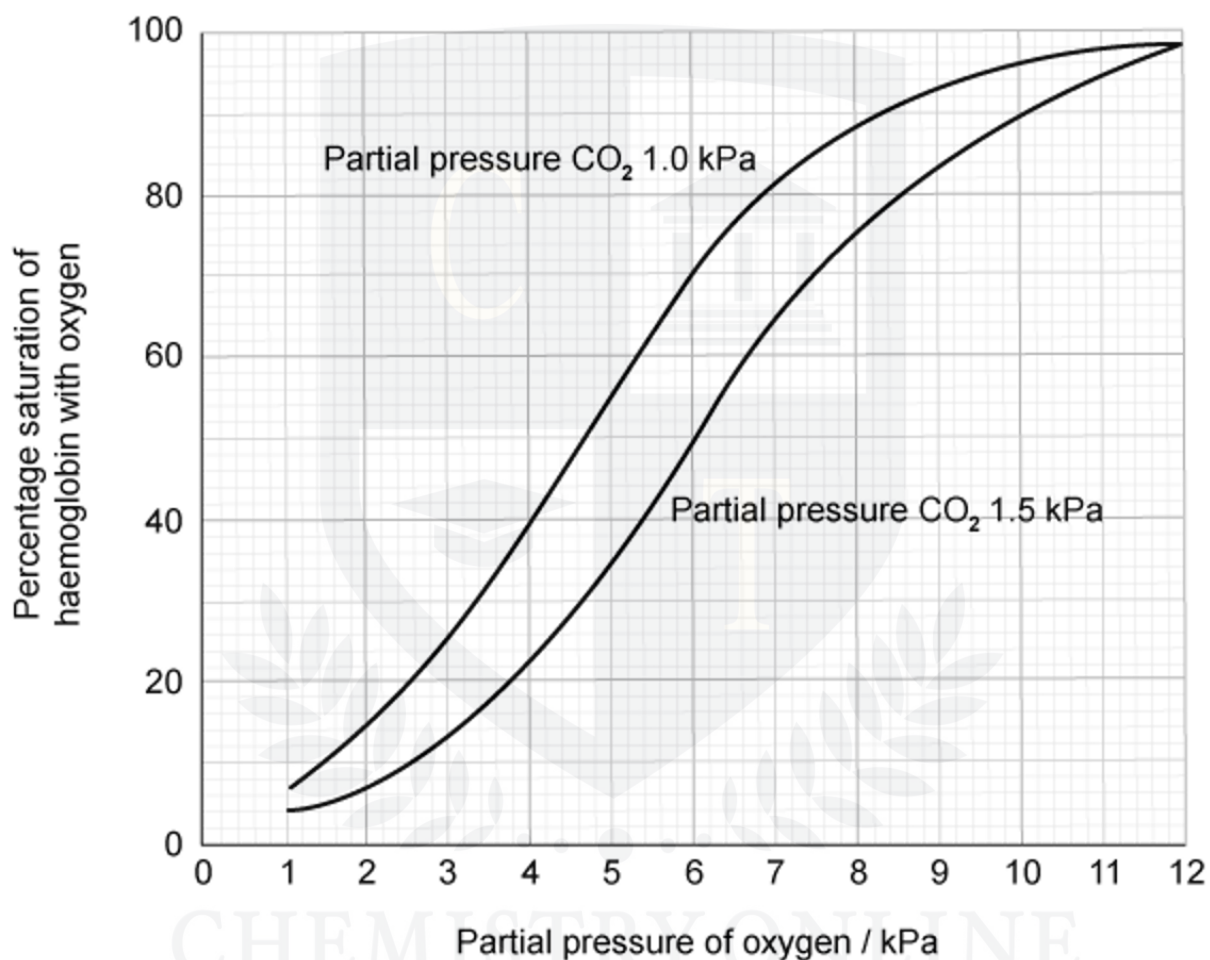
C 2 only

D 5 only

[1 mark]

Question 7

The graph below shows the oxygen dissociation curves for haemoglobin at different partial pressures of carbon dioxide.



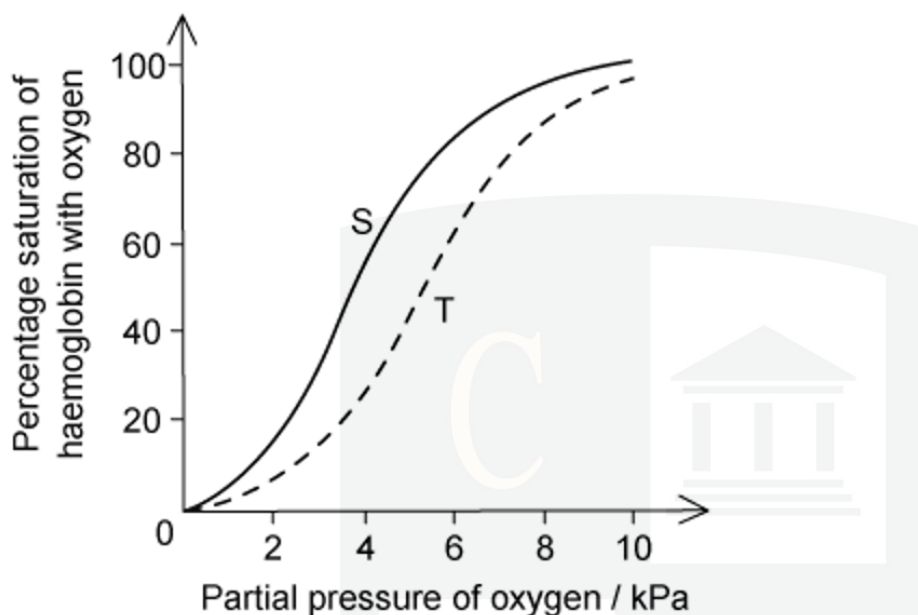
Which of the following shows the correct percentage change in percentage saturation of haemoglobin at a partial pressure of 6 kPa between the partial pressures of carbon dioxide from 1.0 kPa and 1.5 kPa?

- A** 46% **B** 20% **C** -20% **D** -26%

[1 mark]

Question 8

The graph shows the Bohr effect



Which of the following explains the shift from **S** to **T**?

- A** Increased concentration of carbon dioxide and low pH.
- B** Increased concentration of carbon dioxide and high pH.
- C** Decreased concentration of carbon dioxide and low pH.
- D** Decreased concentration of carbon dioxide and high pH.

[1 mark]

Question 9

The partial pressure of oxygen decreases as altitude increases from sea level.

Which row of the table below correctly describes the reason for the response of the body at high altitude?

	description	reason
A	red blood cells have genes switched on	so red blood cells produce more haemoglobin
B	oxygen dissociation curve shifts to the right	to compensate for an increase in oxygen unloading in tissues
C	percentage saturation of haemoglobin with oxygen in lungs decreases	so more red blood cells are produced to carry more haemoglobin
D	more red blood cells	because haemoglobin breaks down more rapidly

[1 mark]

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Question 10

The following events happen when carbon dioxide enters an erythrocyte in a capillary.

- 1 Hydrogen carbonate ions diffuse into the plasma from the erythrocyte.
- 2 Dissociation of carbonic acid.
- 3 Carbon dioxide reacts with water forming carbonic acid.
- 4 Chloride ions diffuse into erythrocytes from plasma.

Which row in the table below shows the correct sequence of events?

	first step	→	→	last step
A	2	4	1	3
B	3	2	1	4
C	3	1	4	2
D	2	3	4	1

[1 mark]

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