A Level Biology B

H422/02 Scientific literacy in biology

Question Set 6

1. (a) (i) Patients with chronic anaemia have reduced levels of haemoglobin in their blood. When anaemia develops over a long period of time, the concentration of the compound 2,3-bisphosphoglycerate (2,3-BPG) in the blood increases.

Fig. 6 shows the oxygen dissociation curves of haemoglobin from two individuals, one suffering from chronic anaemia and the other a normal control.

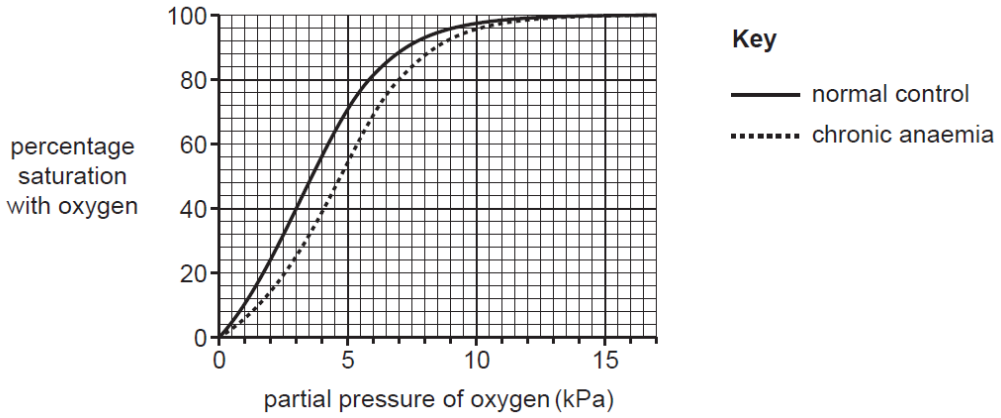

Fig. 6

P_{50} is the partial pressure of oxygen at which haemoglobin is 50% saturated.

Using Fig. 6, calculate the percentage increase in P_{50} in the anaemic patient compared with the normal control.

Show your working. Give your answer to **three** significant figures. **[2]**

(ii) Using the data in **Fig. 6**, describe the effect of 2,3-BPG on the oxygen affinity of haemoglobin.

Explain how this effect might partially compensate for the reduction in levels of haemoglobin that occur in anaemic patients. **[3]**

(b) (i) Haemoglobin is contained in erythrocytes. While studying oxygen transport, a student investigated the water potential of erythrocytes. They wrote the following description in their laboratory notebook:

I placed a drop of blood on a microscope slide and covered it with a coverslip, then added a drop of distilled water on one side of the coverslip. I immediately observed the slide under high power. I repeated the procedure with sodium chloride solutions of two different concentrations to find the one that caused plasmolysis to occur.

Explain why the term 'plasmolysis' is used incorrectly in this student's description. **[1]**

(ii) State **two** ways in which the experimental procedure described by the student could be improved. **[2]**

Total Marks for Question Set 6: 8