Cells Homework 4

1. A reaction takes place because the active site of an enzyme is complementary to

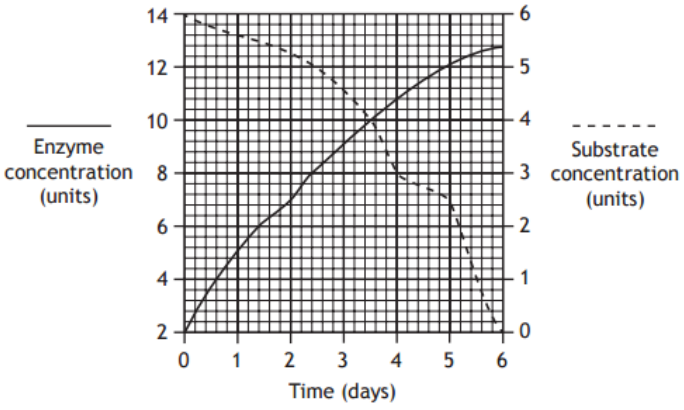
A one type of substrate molecule

B all types of substrate molecule

C one type of product molecule

D all types of product molecules.

2. The graph below shows changes in the enzyme and substrate concentrations in a seed over a period of time.



How many days does it take for the substrate concentration to decrease by 50%?

A 2

B 3

C 4

D 5

3. Enzymes act as catalysts because they

A are composed of protein

B act on any substrate

C are unaffected by temperature

D speed up chemical reactions in cells.

4. The table below compares the rate of extinction of mammal species over two different time periods.

Time period (years)	*Rate of extinction per 100 years*
1500 – 1900	4·5
1900 – 2000	90

The ratio of extinction rates between 1900 – 2000 compared to 1500 – 1900 is

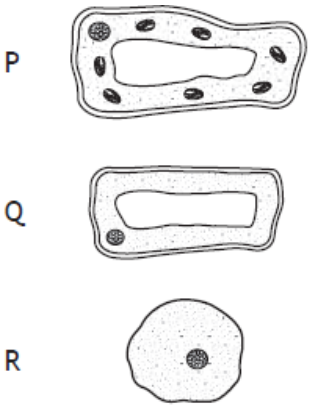
A 1:20

B 1:2

C 2:1

D 20:1.

5. The following diagram represents three types of cells.



Identify the plant cell (s).

A P & R only

B P & Q only

C P only

D R only

1 Catalase, an enzyme found in living tissues, is involved in the breakdown of hydrogen peroxide into water and oxygen.

In an investigation, catalase was extracted in solution from a variety of tissues and used to soak paper discs. These discs were then dropped into beakers of hydrogen peroxide, as shown in Diagram 1. As the oxygen was released the discs returned to the surface, as shown in Diagram 2.

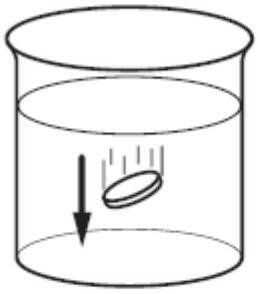


Diagram 1

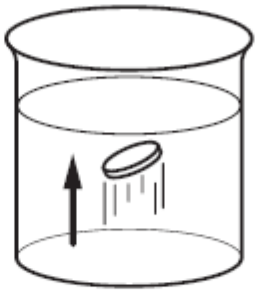


Diagram 2

The time taken for these discs to return to the surface was recorded and shown in the table.

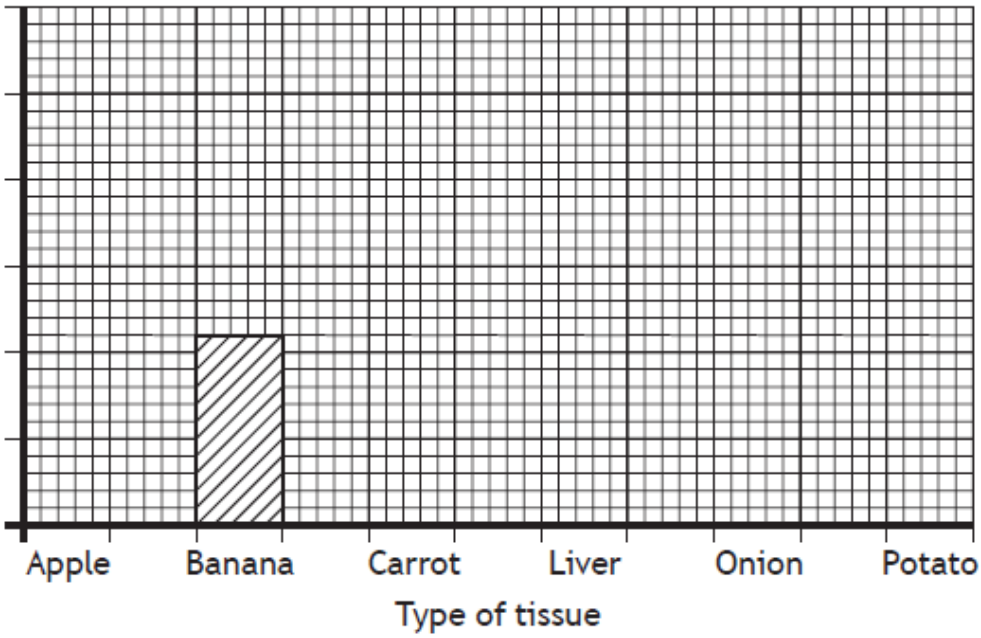
Type of tissue	*Time for disc to return to the surface* (s)
Apple	108
Banana	44
Carrot	68
Liver	8
Onion	70
Potato	72

a) Name the independent variable.

_____ 1

Total Marks = 14

b) On the grid below, complete the vertical axis and the remaining bars to show the time taken for the discs to return to the surface, for each tissue. 2



c) The aim of the experiment was to investigate catalase activity in a variety of tissues.

Using the information given, write an appropriate conclusion for this experiment. 1

Conclusion _____

_____

_____

d) The experiment was carried out at pH 7, the optimum pH for catalase.

Complete the following sentence, using the words **increase, decrease** or **stay the same**, to predict what would happen if the experiment was repeated at pH 4. 1

At pH 4, the rate of oxygen production would _____

in each tissue.

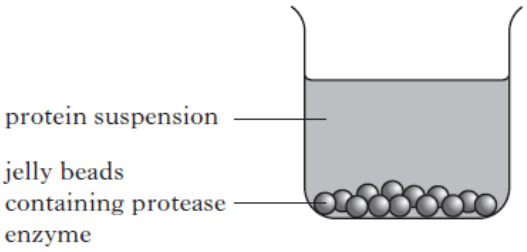
e) The experiment was said to be unreliable. Explain how to improve the reliability of the experiment.

_____ 1

Total Marks = 14

2. In an investigation into the digestion of protein, two groups of pupils made jelly beads containing a protease enzyme.

The beads were then left in a beaker of cloudy protein suspension for 20 minutes. The contents of the beaker became clear as the protein was digested.



a) Describe the contents of a beaker which would be a suitable control in this investigation.

_____

_____ 1

b) Explain the findings that the protein suspension was not digested when a lipase enzyme was used instead of the protease enzyme.

_____

_____ 1

c) While making their jelly beads one of the groups accidentally rinsed the beads in very hot water instead of cold water.

Predict the effect that this would have on the results of the investigation.

Prediction _____

Reason _____

_____ 1

d) State the term used to describe the temperature at which an enzyme works best.

_____ 1

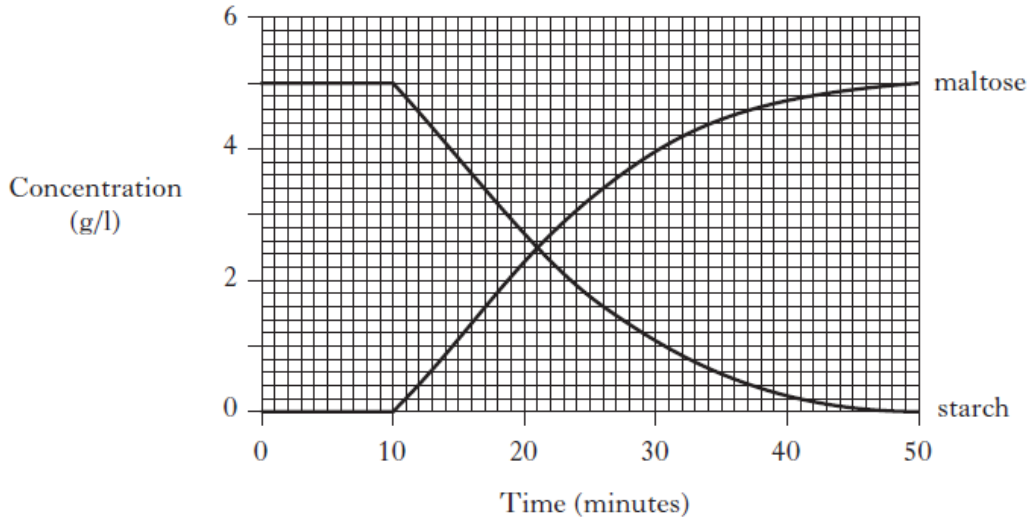
e) Name one factor, other than temperature which has an effect on enzyme activity.

_____ 1

Total Marks = 14

3. In an investigation into the digestion of starch, a beaker containing a solution of starch was placed in a water bath at 30°C. A test tube containing an enzyme solution was also placed in the water bath.

After some time, the enzyme solution was added to the starch solution and stirred. The concentration of starch and maltose sugar was then measured regularly as shown on the graph below.



a) Using the graph above, state how long the solutions were left in the water bath before being mixed.

_____ minutes 1

b) Give a reason why the solutions were left for some time before being mixed.

_____

_____ 1

c) At what time into the investigation was exacty half the starch digested.

_____ minutes 1

d) Describe the evidence from the graph above that shows that maltose was produced from starch.

_____

_____ 1

e) Name the enzyme used in this investigation.

_____ 1

Total Marks = 14

4 (a) Hydrogen peroxide can damage cells and lead to cell death. Catalase is an enzyme which breaks down hydrogen peroxide into oxygen and water.

Scientists in New Zealand investigated the link between the level of catalase in sheep livers and the fat in their meat. The hypothesis was that the higher the level of liver catalase, the greater the fat content of the meat.

In the investigation, they examined 9 sheep with a high percentage of fat and 15 sheep with a low percentage of fat. The sheep with the high percentage of fat had an average catalase level of 4800 K/g and those with the lower percentage of fat had an average catalase level of 3600 K/g.

The scientists concluded that their hypothesis was correct.

(i) Name the substrate of catalase. 1

(ii) Identify an aspect in the planning of the investigation that would suggest that the hypothesis might not be proven correct. 1

(iii) A further investigation proved that the hypothesis was correct.

Describe how this investigation could help farmers to select only sheep with a low percentage of fat, to provide meat for consumers following a low fat diet. 1

(b) The optimum temperature for the activity of catalase is 37°C.

Predict what would happen to the activity of catalase if the temperature was lowered to 34°C. 1

Total Marks = 14