PEARSON EDEXCEL A-LEVEL BIOLOGY B · 9BI0

BIOLOGY



EXAM QUESTION PACK

TOPIC 1: BIOLOGICAL MOLECULES

CORE PRACTICAL 1

SCORE	PERCENTAGE
/48	%

STEMUP

These questions belong to Pearson Edexcel, not to us.

The examination questions and mark schemes in this pack were written and published by Pearson Edexcel. They are past assessment materials, reproduced here so that students can revise from them.

What we do not own

STEMUP is not affiliated with Pearson Edexcel and does not own, and makes no claim to own, any of the question or mark scheme material in this pack. Pearson has not endorsed, approved or been involved in the production of it. Pearson, Edexcel and the qualification titles used here belong to their respective owners and appear for identification only.

Where to find the originals

Pearson publishes its past papers and mark schemes free of charge. Always check the current specification at qualifications.pearson.com before you revise, because content and wording can change between series.

If you hold the rights to any material in this pack and would like it amended or removed, contact admin@stemup.co.uk and we will act on it.

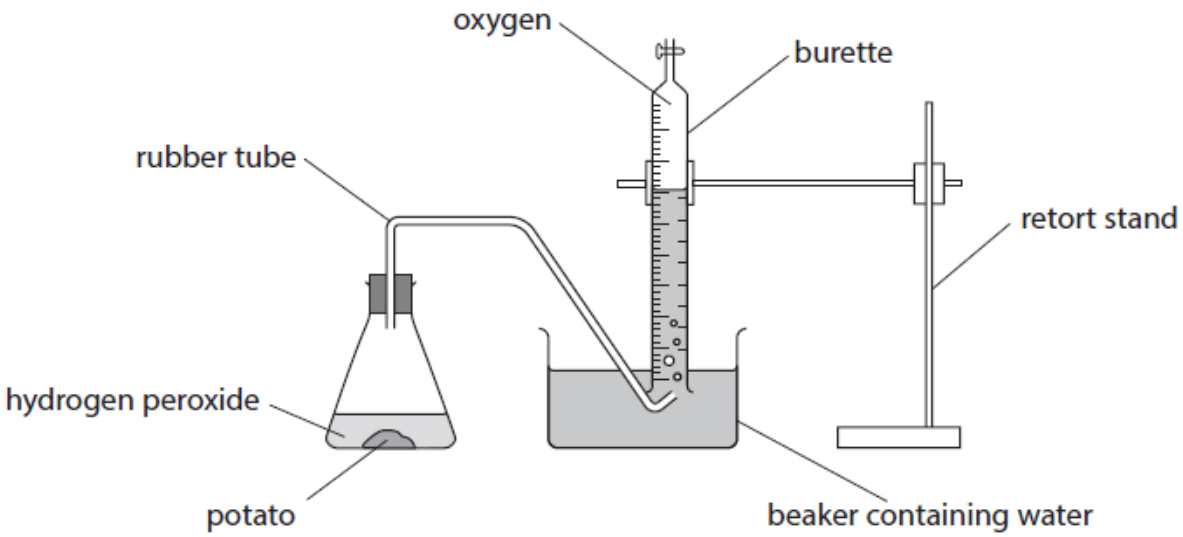
Q1.

The activity of enzymes is affected by a number of factors.

A student investigated the activity of the enzyme catalase in potato.

This enzyme is found in potato cells. It catalyses the conversion of hydrogen peroxide to oxygen and water.

The diagram shows the apparatus used to collect the data.



(i) Describe how two named variables, other than the potato, can be controlled in order to obtain valid results.

(4)

.....

.....

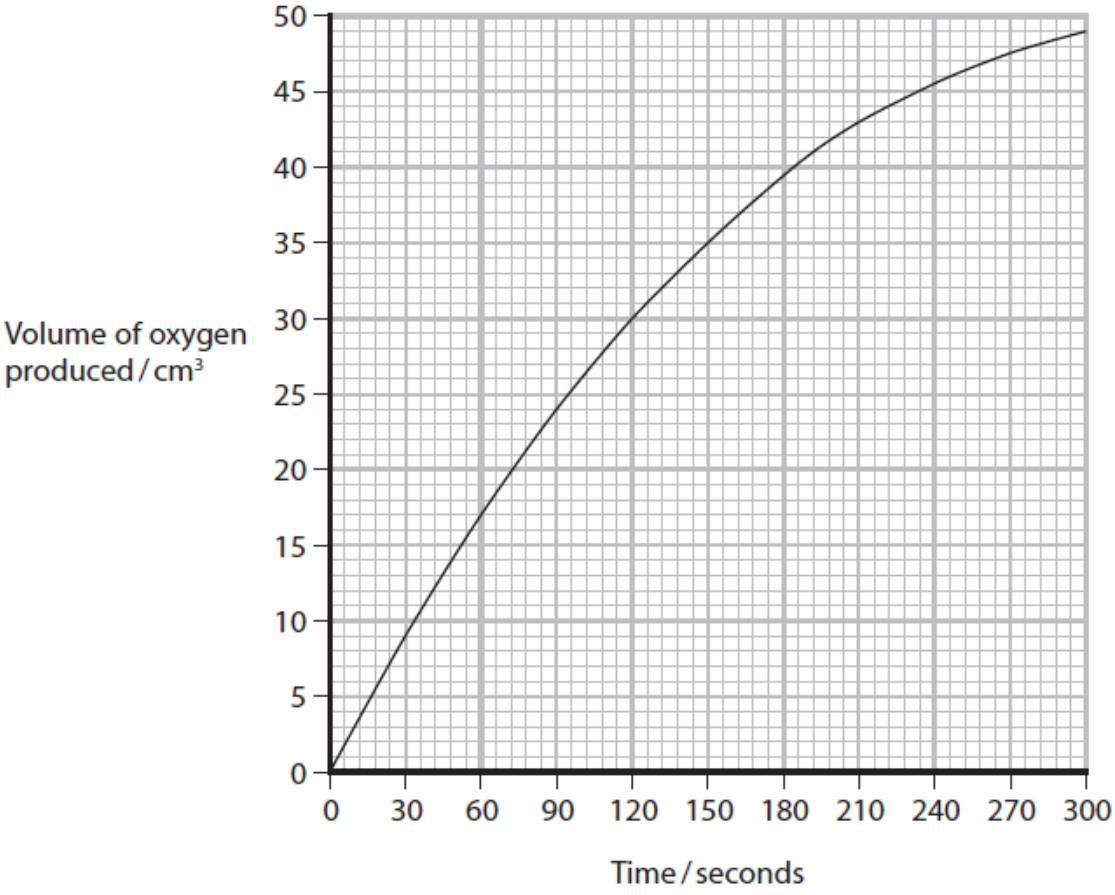
.....

.....

.....

.....

(ii) The graph shows the results of the investigation.



Determine the initial rate of reaction from this graph.

(1)

Answer .....

(iii) Explain why the rate of reaction decreases over time.

(2)

.....

.....

.....

.....

.....

.....

(Total for question = 7 marks)

Q2.

Glucose and fructose are monosaccharides.

The makers of sweet tasting drinks use the enzyme glucose isomerase to convert glucose into fructose.

Fructose is a monosaccharide that tastes much sweeter than glucose.

(i) Explain a possible health benefit of converting glucose into fructose for use in sweet tasting drinks.

(2)

.....

.....

.....

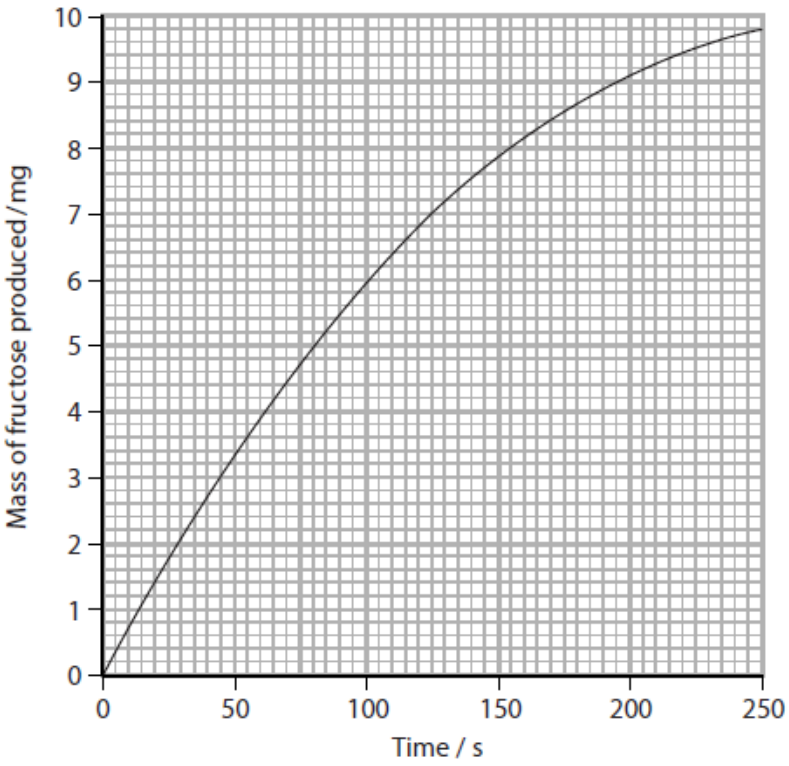
.....

.....

.....

(ii) A student investigated the activity of glucose isomerase.

The graph shows the results of this investigation.



Determine the initial rate of the reaction.

(1)

Answer .....

(iii) Cofactors are non-protein molecules that help enzymes to function.

Magnesium ions act as cofactors for some enzymes.

Devise an experiment to investigate the effect of magnesium ions on the initial rate of this reaction.

(5)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

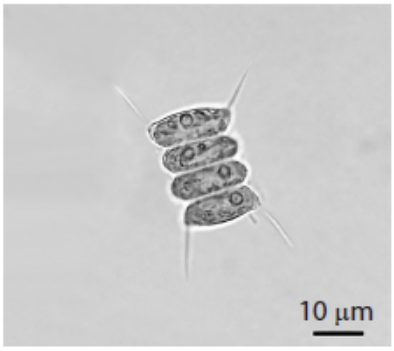
.....

(Total for question = 8 marks)

Q3.

The green alga, *Scenedesmus quadricauda*, lives in fresh water.
Each cell has a single chloroplast.

The photograph shows some *Scenedesmus* cells.



Photosynthesis can be measured if these algae are placed in a solution containing hydrogen carbonate indicator.

When the carbon dioxide concentration is the same as that of atmospheric air, the hydrogen carbonate indicator is red.

As the carbon dioxide concentration decreases, the hydrogen carbonate indicator changes colour from red to pink and then to purple.

A student investigated the effect of light on the rate of photosynthesis in *S. quadricauda*.

He used different coloured filters to vary the wavelength of the light.

The algae were added to a solution of hydrogen carbonate indicator in a test tube.

The test tube was sealed and placed under a lamp with a red filter.

After 30 minutes, the student noted the colour of the hydrogen carbonate indicator.

He then shook the open test tube until the indicator returned to its original colour.

He repeated this procedure with yellow, green and blue filters, using the same algae and the same indicator solution.

The student's results are shown in the table.

colour of filter	wavelength of light / nm	colour of indicator after 30 minutes
red	640	reddish pink
yellow	580	pink
green	520	pinky purple
blue	460	dark purple

(i) Analyse the data to explain what conclusion may be drawn from these results.

(2)

.....

.....

.....

.....

.....

.....

.....

(ii) The student repeated the method using fresh hydrogen carbonate indicator and a new sample of *S. quadricauda*.

This time he used the blue filter first, then green, then yellow, then red.

The results are shown in the table.

colour of filter	wavelength of light / nm	colour of indicator after 30 minutes
blue	460	reddish pink
green	520	pink
yellow	580	pinky purple
red	640	dark purple

*Evaluate the student's investigation.

(9)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

Q4.

An investigation was carried out to determine the effect of substrate concentration on the initial rate of an enzyme-controlled reaction.

The substrate used was powdered milk, which is made up of a protein called casein.
A solution of powdered milk is a cloudy white colour.

Protease enzymes will break down the casein in powdered milk to form a clear solution.

A colorimeter can be used to measure the amount of light absorbed by a solution in a tube. A cloudy solution absorbs more light.

5 cm^3 of 0.1% solution of powdered milk was added to a colorimeter tube and mixed with 0.1 cm^3 of a protease enzyme. The mixture was quickly placed in the colorimeter and the absorption of the solution was then recorded every 10 seconds for 30 seconds.

This was then repeated using different concentrations of casein.

(a) Explain why it is important to measure the initial rate of enzyme-catalysed reactions.

(3)

.....

.....

.....

.....

.....

.....

(b) A student carrying out this investigation recorded the data shown in the table below.

Casein concentration (%)	Absorption (arbitrary units)			
	0 s	10 s	20 s	30 s
0.1	0.15	0.10	0.05	0.05
0.2	0.44	0.34	0.23	0.15
0.3	0.67	0.49	0.32	0.16
0.4	0.87	0.65	0.43	0.22
0.5	0.98	0.75	0.52	0.26

(i) Explain why using all of the absorption data from every concentration of casein would not give a valid comparison of initial rates.

(2)

.....

.....

.....

.....

.....

(ii) Explain how the results obtained could be used in the design of an investigation to compare the activity of proteases from different mammals.

(2)

.....

.....

.....

.....

.....

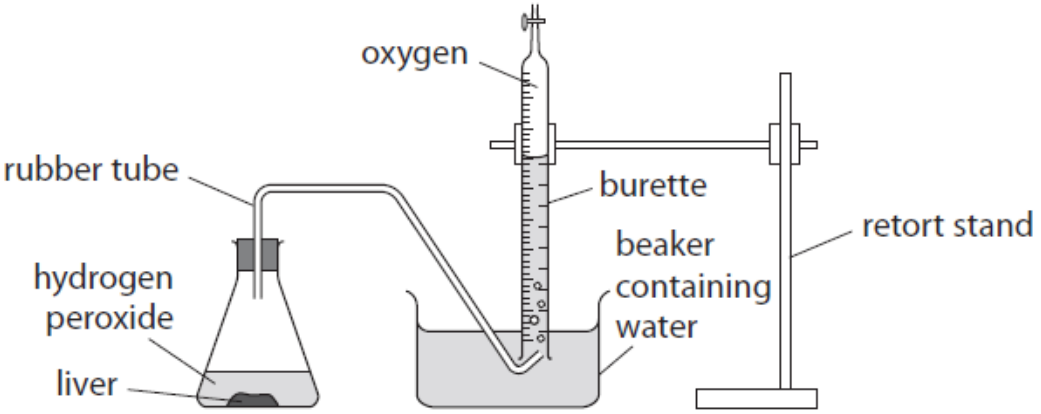
(Total for question = 7 marks)

Q5.

Liver cells contain an enzyme called catalase.

This enzyme changes hydrogen peroxide in the liver cells into water and oxygen.

A group of students used the apparatus shown to compare the activity of catalase in raw liver tissue and in boiled liver tissue.



The students used the following method.

- a burette filled with water is placed in a beaker containing water
- add hydrogen peroxide to the conical flask
- open the conical flask and drop 0.1g of raw liver into the hydrogen peroxide
- replace the bung on the conical flask
- after 10 seconds pinch the rubber tube to stop any more oxygen entering the burette
- measure the volume of oxygen collected in the burette
- repeat this method for boiled liver

The table shows the results obtained by each student.

Student	Volume of oxygen collected in 10 seconds / cm^3	
	Raw liver	Boiled liver
1	19	0
2	40	0
3	28	0
4	38	0
5	42	0
6	29	0
7	34	0
8	46	0
9	38	0

The results for the volume of oxygen collected by each student using raw liver were different.

Give **four** possible improvements to the method used by these students that would reduce the variability of the results.

(4)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 4 marks)

Q6.

Cysteine proteases are enzymes found in fruits such as pineapples.

When a protease enzyme is added to fat-free skimmed milk, the milk turns from cloudy to clear.

Devise an investigation to find the optimum temperature for the activity of the enzyme cysteine protease found in pineapples.

(6)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 6 marks)

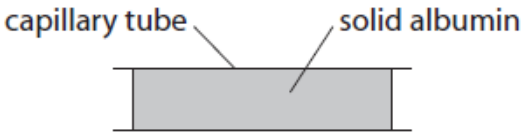
Q7.

The egg of a hen contains albumin, a globular protein.

Pepsin is an enzyme that digests albumin.

Albumin can be put into a 50 mm long capillary tube and then made solid by boiling in water for 10 minutes.

The diagram shows a 50 mm capillary tube containing solid albumin.



Devise an investigation into the effect of pepsin concentration on the digestion of solid albumin.

(5)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for question = 5 marks)