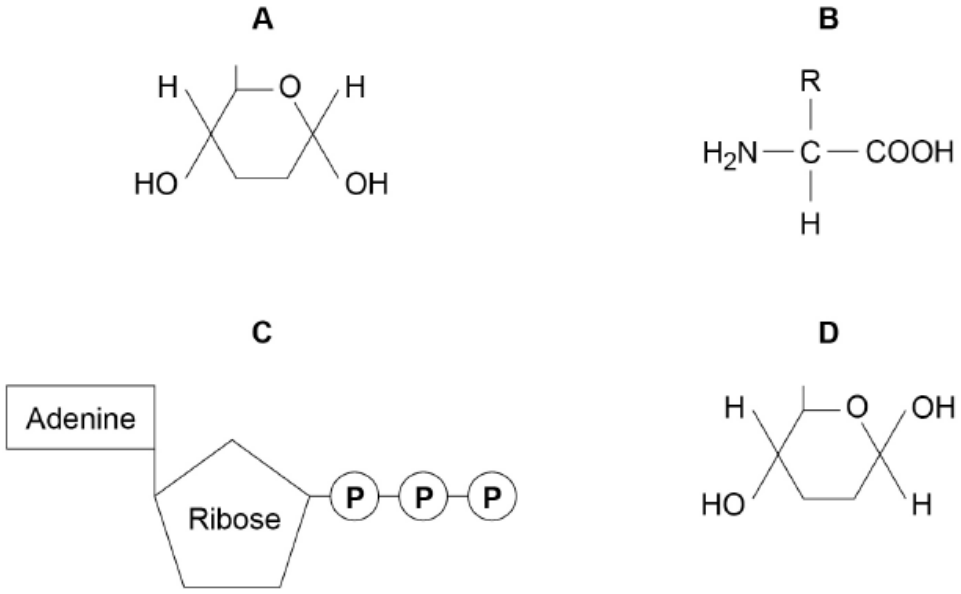
AQA – Biological Molecules – AS Biology P1

1. May/2020/Paper_1/No.1

0 1 **Figure 1** shows the structure of molecules found in organisms.

Figure 1



0 1 . 1 Complete **Table 1** by putting the correct letter, **A**, **B**, **C** or **D**, in the box next to each statement. Each letter may be used once, more than once, or not at all.

[4 marks]

Table 1

Letter	Statement
	is a monomer in an enzyme's active site
	is a monomer in cellulose
	is produced during photosynthesis and respiration
	forms a polymer that gives a positive result with a biuret test

0 1 . 2 Raffinose is a trisaccharide of three monosaccharides: galactose, glucose and fructose. The chemical formulae of these monosaccharides are:

- galactose = $C_6H_{12}O_6$
- glucose = $C_6H_{12}O_6$
- fructose = $C_6H_{12}O_6$

Give the number of carbon atoms, hydrogen atoms and oxygen atoms in a molecule of raffinose.

[1 mark]

Number of carbon atoms _____

Number of hydrogen atoms _____

Number of oxygen atoms _____

0 1 . 3 A biochemical test for reducing sugar produces a negative result with raffinose solution.

Describe a biochemical test to show that raffinose solution contains a non-reducing sugar.

[3 marks]

_____

_____

_____

_____

_____

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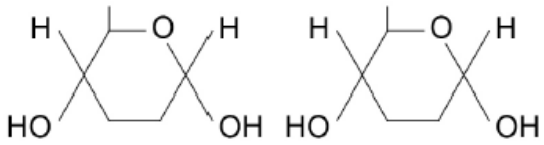
_____

2. May/2019/Paper_1/No.3

0 3 **Figure 2** shows the structure of two α-glucose molecules.

Figure 2



0 3 . 1 On **Figure 2**, draw a box around one chemical group in each glucose molecule used to form a glycosidic bond.

[1 mark]

0 3 . 2 A precipitate is produced in a positive result for reducing sugar in a Benedict's test.
A precipitate is solid matter suspended in solution.

A student carried out the Benedict's test. Suggest a method, other than using a colorimeter, that this student could use to measure the **quantity** of reducing sugar in a solution.

[2 marks]

[Extra space]

In an investigation, a student wanted to identify the solutions in two beakers, **A** and **B**. She knew one beaker contained maltose solution and the other beaker contained glucose solution. Both solutions had the same concentration.

She did two separate biochemical tests on a sample from each beaker.

Test 1 – used Benedict's solution to test for reducing sugar.

Test 2 – added the enzyme maltase, heated the mixture at 30 °C for 5 minutes, and then used Benedict's solution to test for reducing sugar.

Maltose is hydrolysed by maltase.

The student's results are shown in **Table 1**.

Table 1

	Colour of solution after testing with Benedict's solution	
Beaker	**Test 1**	**Test 2**
A	red	red
B	red	dark red

0 3 . 3 Explain the results for beakers **A** and **B** in **Table 1**.

[2 marks]

Beaker A _____

_____

_____

_____

Beaker B _____

_____

_____

_____

0 3 . 4 Use of a colorimeter in this investigation would improve the repeatability of the student's results.

Give **one** reason why.

[1 mark]

In **Test 1**, the student used a measuring cylinder to measure 15 cm^3 of solution from a beaker. The measuring cylinder gives a volume with an uncertainty of ± 1 cm^3. She used a graduated syringe to measure 5.0 cm^3 of Benedict's solution. The graduated syringe gives a volume with an uncertainty of $\pm$ 0.5 cm^3. She mixed these volumes of liquid to do the biochemical test.

0 3 . 5 Calculate the percentage error for the measurements used to obtain a 20 cm^3 mixture of the solution from the beaker and Benedict's solution. Show your working.

[2 marks]

Answer = _____ %

3. May/2019/Paper_1/No.7

0 7 . 1 Explain how the active site of an enzyme causes a high rate of reaction.

[3 marks]

The action of the enzyme catalase is shown below.

$$\text{hydrogen peroxide} \xrightarrow{\text{catalase}} \text{water} + \text{oxygen}$$

A student investigated the effect of hydrogen peroxide concentration on the rate of this reaction. He used catalase from potato tissue.

The student:

- put five potato chips in a flask
- added 20 cm^3 of 0.5 mol dm^{-3} hydrogen peroxide solution to the flask
- measured the time in seconds for production of 10 cm^3 of oxygen gas
- repeated this procedure with four different concentrations of hydrogen peroxide solution.

His results are shown in **Table 5**.

Table 5

Hydrogen peroxide concentration / mol dm^{-3}	Time for production of 10 cm^3 of oxygen gas / seconds	Rate of reaction / arbitrary units
0.5	18	
1.0	10	
1.5	7	
2.0	6	
2.5	6	

0 7 . 2 Other than those stated, give **one** factor the student would have controlled in his investigation.

[1 mark]

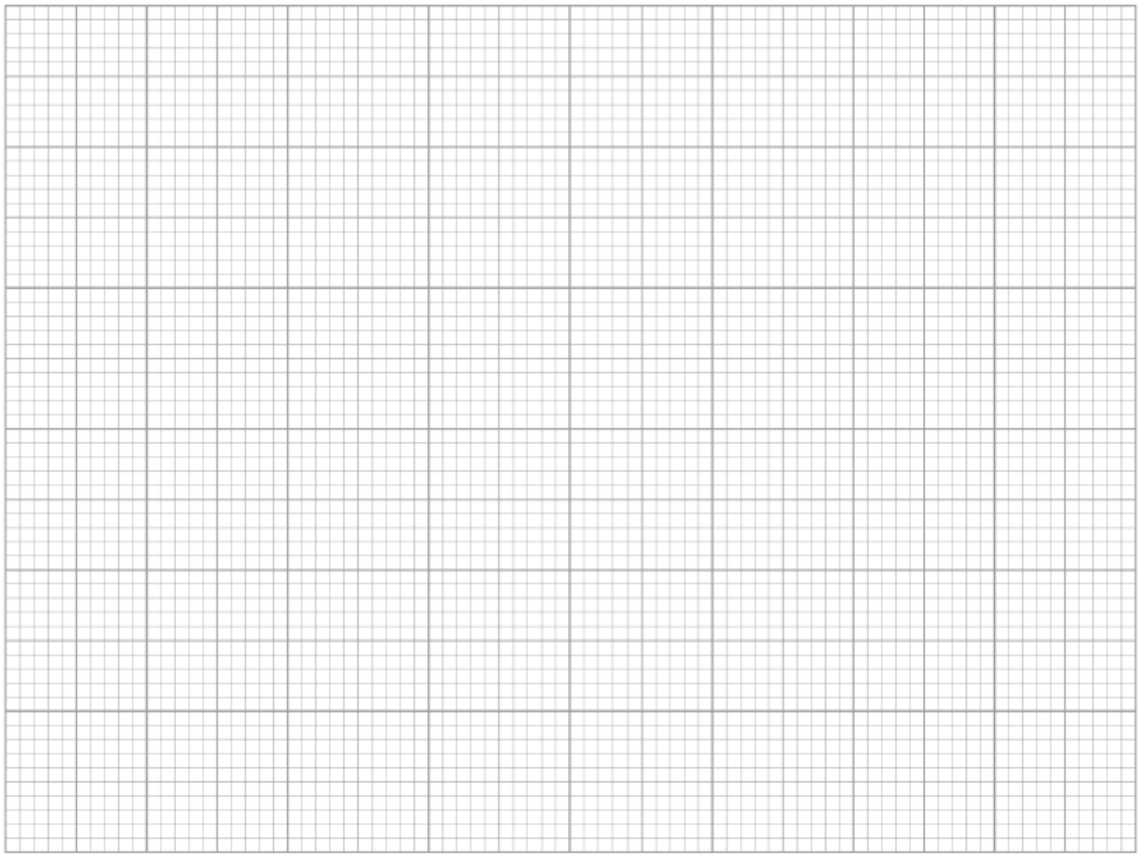
0 7 . 3 The student gave the maximum rate of reaction a value of 1.0 arbitrary units.

Complete **Table 5** by calculating the rate of reaction in arbitrary units at each hydrogen peroxide concentration. Record the rates using an appropriate number of significant figures.

[2 marks]

0 7 . 4 Plot a suitable graph of your processed data shown in **Table 5**.

[3 marks]



0 7 . 5 Suggest a change the student could make to his procedure so that 10 cm^3 of oxygen would be produced in less than 6 seconds.

[1 mark]

4. May/2019/Paper_1/No.8

0 8 . 1 Describe a biochemical test to confirm the presence of protein in a solution.

[2 marks]

0 8 . 2 A dipeptide consists of two amino acids joined by a peptide bond. Dipeptides may differ in the type of amino acids they contain.

Describe **two other** ways in which all dipeptides are similar and **one** way in which they might differ.

[3 marks]

Similarities

1

2

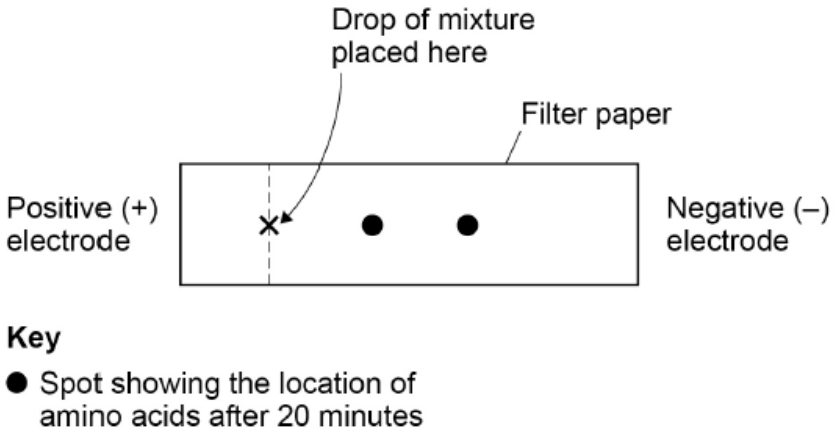
Difference

A solution contained a mixture of **three** different amino acids. A scientist passed an electric current through the solution to separate the amino acids.

She placed a drop of the mixture at one end of a piece of filter paper, attached an electrode to each end of the paper and switched on the current. She switched off the current after 20 minutes and stained the paper to show spots of the amino acids at new positions.

Her results are shown in **Figure 6**.

Figure 6



0 8 . 3 Explain what the positions of the spots in **Figure 6** show about these amino acids.

[3 marks]