



CHEMISTRY ONLINE
— **TUITION** —

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BIOLOGY

BIOLOGICAL MOLECULES

LEVEL & BOARD:	AQA (A - LEVEL)
TOPIC:	Enzymes
PAPER TYPE:	Question Paper 1
TOTAL QUESTIONS:	04
TOTAL MARKS:	25

Enzymes - 1

1. (a) Describe how an enzyme's active site generates a high rate of reaction.

[3 marks]

The action of the enzyme catalase is shown below.



A student examined how the amount of hydrogen peroxide affected the reaction's speed. Catalase from potato tissue was employed by him.

The student:

- Put in a flask five potato chips.
- In the flask, 20 cm³ of 0.5 mol dm³ hydrogen peroxide solution was added.
- To produce 10 cm³ of oxygen gas, measured the time in seconds.
- Four different concentrations of hydrogen peroxide solution were repeated in this procedure.

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	

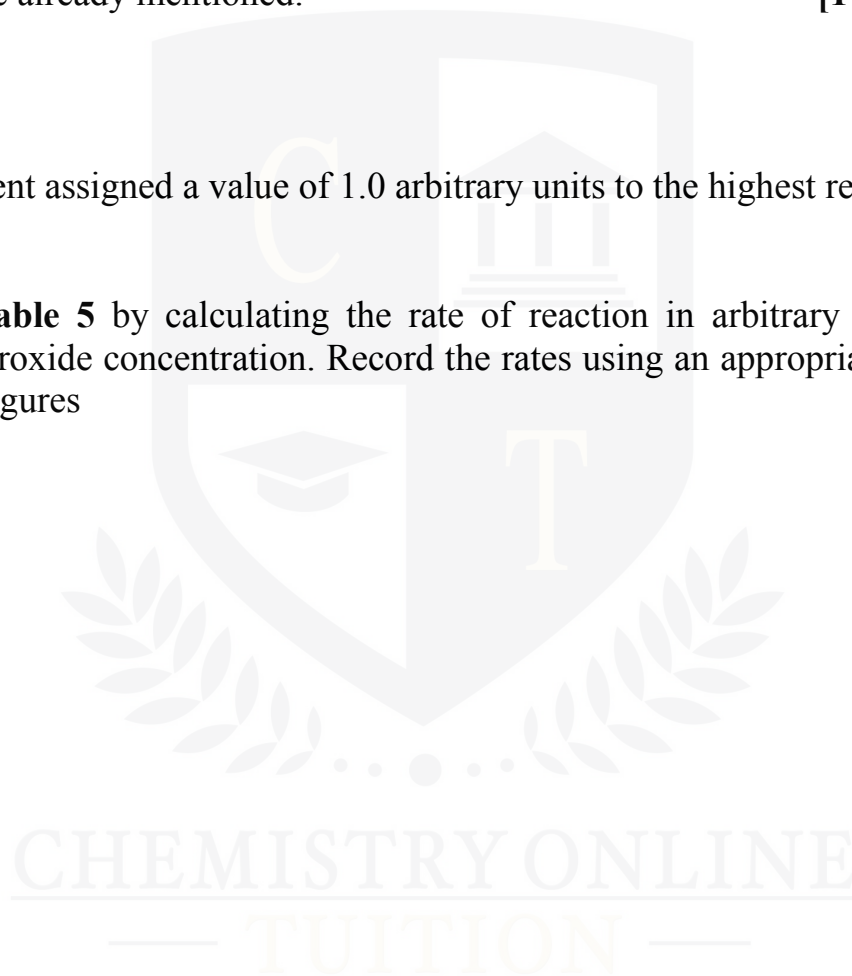
1.5	7	
2.0	6	
2.5	6	

(b) Give one more factor that the student could have managed in his investigation besides those already mentioned. **[1 mark]**

(c) The student assigned a value of 1.0 arbitrary units to the highest reaction rate.

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

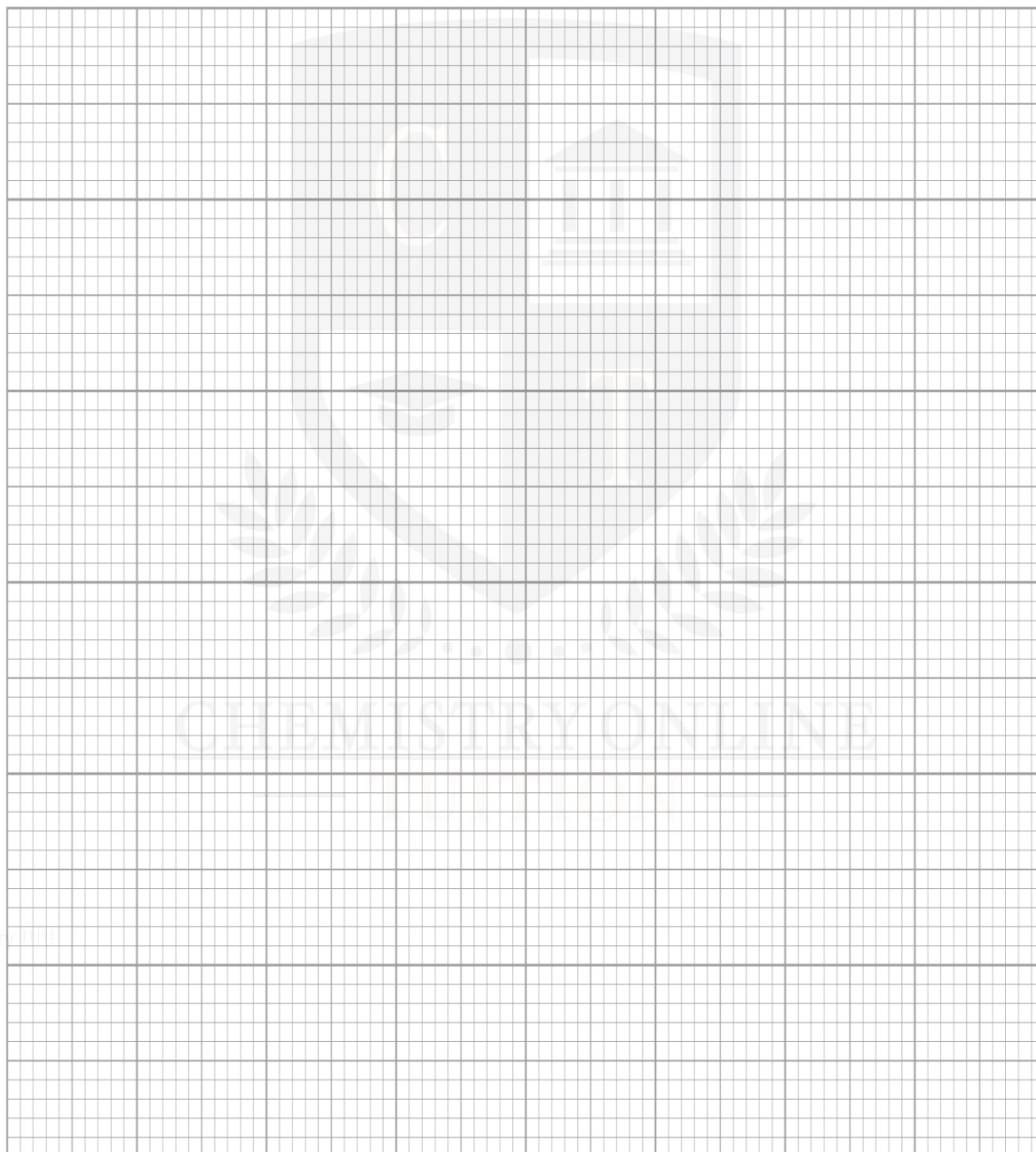
[2 marks]



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(d) Calculate an adequate graph of the data processed as shown in Table 5.

[3 marks]



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(e) Give the student some advice on adjusting his technique to produce 10 cm³ of oxygen in less than 6 seconds.

[1 marks]

2. (a) Describe a biochemical procedure that might be used to confirm the presence of protein in a solution.

[2 marks]

(b) Two amino acids joined by a peptide bond make up a dipeptide. The composition of amino acids in different dipeptides may vary.

Identify two more similarities and one possible difference between all dipeptides.

[3 marks]

Similarities

1

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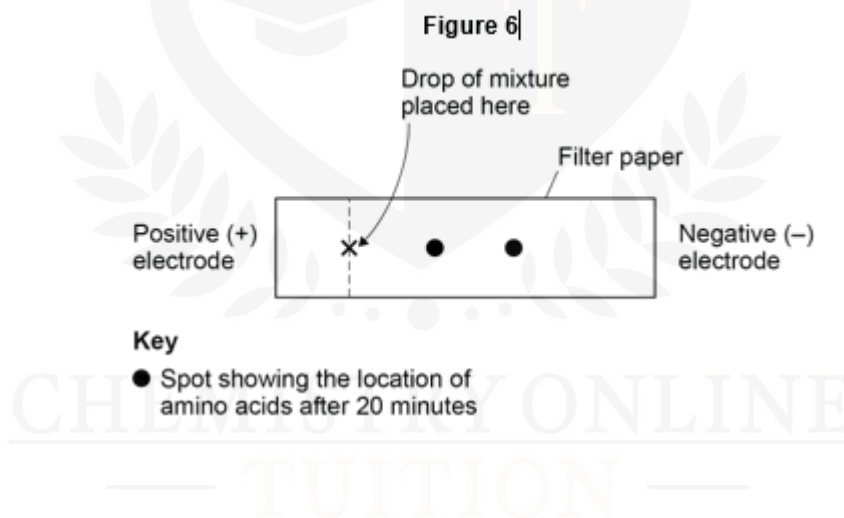
2

Difference

Three distinct amino acids were combined in a solution. To separate the amino acids, a scientist ran an electric current across the fluid.

She affixed an electrode to each end of a piece of filter paper, placed a drop of the mixture at one end of the paper, and turned on the current. After 20 minutes, she turned off the electricity and stained the paper to reveal patches of the amino acids in different locations.

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



(c) What do the spots' locations in Figure 6 indicate about these amino acids? Explain

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[3 marks]

3.

Read the following passage.

Researchers looked at how a novel medication called ABZ affected cells that became stomach tumors in lab experiments. They discovered that ABZ prevented the development of spindle fibers, which prevented mitosis. They also discovered that some healthy cells were impacted by ABZ.

A controlled process, mitosis. The protein cyclin B is located in the nucleus of a cell. Throughout the cell cycle, it controls when mitosis will occur. Cyclin B content in the nucleus rises dramatically to signal the beginning of mitosis and declines to signal its completion. The researchers discovered that ABZ raised and preserved a high level of Cyclin B in stomach tumor cells.

Apoptotic cell death is referred to as such. Bcl-2 and Bax, two nuclear proteins, are important in regulating apoptosis. When the Bcl-2 to Bax ratio is high, apoptosis is inhibited, and when it is low, it is promoted. The researchers discovered that in stomach tumor cells, ABZ enhanced the concentration of Bax and lowered the content of Bcl-2.

The researchers concluded from their findings that ABZ could be utilized to treat stomach cancer successfully.

Answer the questions using information from this passage and your understanding.

(a) Why did the cell cycle stop when spindle fiber development was prevented (lines 2-3)?

[2 marks]

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(b) In spite of the fact that ABZ affects certain healthy cells, suggest and elucidate why it might be utilized as a cancer treatment (lines 3-4).

[1 mark]

(c) What can you infer about ABZ's impact on tumor cells?

Use the data on Cyclin B concentration changes (lines 6-7) and Bcl-2 and Bax concentration changes (lines 10–14).

[4 marks]

(d) Evaluate the scientist's suggestion that ABZ could be used to successfully treat stomach cancer.

[3 marks]

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4.

(a) Describe induce fit model.





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