

Surname						Other Names					
Centre Number						Candidate Number					
Candidate Signature						Date					

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General Certificate of Secondary Education
June 2008 / June 2009



ADDITIONAL SCIENCE / BIOLOGY
ISA B2.1 Enzymes and Temperature

ASCC/BLYC/B2.1

To be conducted before 4 May 2009
For submission in May 2008 or May 2009 or May 2010

<p>For this paper you must have:</p> <ul style="list-style-type: none"> • results tables and charts or graphs from your own investigation. <p>You may use a calculator.</p>

For Teacher's Use	
Section	Mark
1	
2	
Total (max 34)	

Time allowed: 45 minutes

Instructions

- Use blue or black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in **Section 1** and **Section 2**.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The maximum mark for this paper is 34.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.

Did this candidate take part in the practical activity?	YES / NO
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Signature of teacher marking this ISA Date

SECTION 1

These questions are about the investigation that **you** did.

Answer **all** questions in the spaces provided.

1 What were you trying to find out in your investigation?

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.....
.....

(2 marks)

2 (a) What was the range of your **independent** variable?

Remember to include the units.

The range was from to

(1 mark)

(b) For each temperature that you tested, it was important that the temperature did not change during the test.

Explain how you made sure that the temperature did not change.

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.....
.....

(2 marks)

3 Explain why it was important for the reactants in the experiment to be kept apart until they were at the correct temperature.

.....
.....

(1 mark)

4 Other than the temperature, state **one** variable that it was important to keep the same during each test.

.....
(1 mark)

5 Which **one** of the following terms would you use to describe your **dependent** variable?

Put a tick (✓) in the box next to your choice.

- Continuous
- Control
- Discrete

(1 mark)

6 Explain how you could check the **reliability** of your results.

.....
.....
(1 mark)

7 What did you find out from your investigation?

I found out that
.....
.....
.....
(2 marks)

8 Suggest **one** way of making the measurements more **precise** in your investigation.

.....
.....
(1 mark)

9 Make sure that **your** results tables and charts or graphs are handed in with this paper. You will be awarded up to 6 marks for these.

(6 marks)

SECTION 2

These questions are about an investigation that may be similar to the one that you did.

Answer **all** questions in the spaces provided.

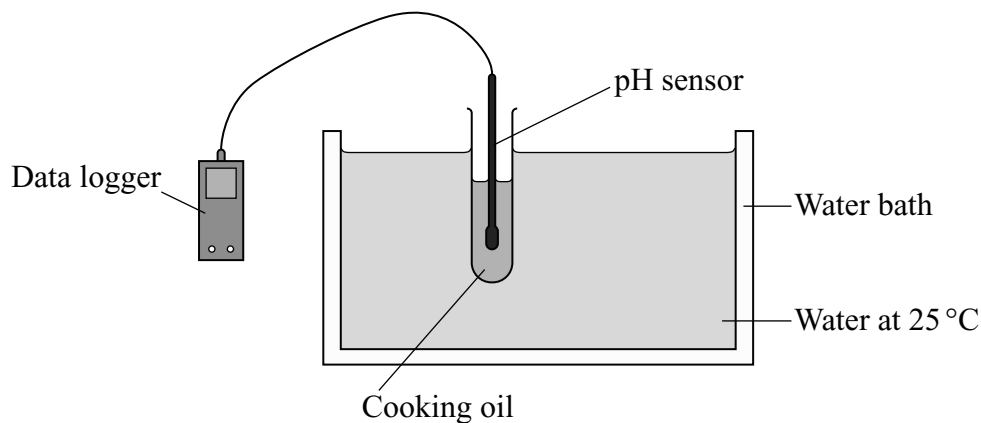
Detergent manufacturers use enzymes in biological washing powders to digest stains.

A manufacturer wants to improve the efficiency of the detergents it produces. Scientists in the research department were asked to find out the best volume of lipase to use.

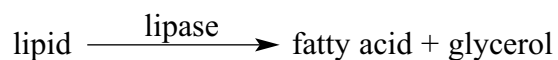
A scientist added different volumes of lipase to 2 cm³ of cooking oil, in test tubes. The test tubes of oil were kept at 25 °C. pH sensors, attached to data loggers, were put into each test tube.

The time taken to reach a pH of 6.0 was recorded.

Each test was carried out three times.



- 10** When lipids (fats and oils) are digested by lipase enzymes, fatty acids and glycerol are produced.



Explain why testing pH is a suitable way of measuring the activity of this enzyme.

.....

.....

(1 mark)

The table shows the results.

Volume of lipase added in drops	Time taken to reach pH 6.0 in seconds			
	Test 1	Test 2	Test 3	Mean
1	236	240	230	235
2	188	198	195	
3	158	154	150	154
4	121	174	133	127
5	95	88	91	91

- 11 Calculate the mean time to reach pH 6.0 when 2 drops of lipase were added.

.....

Write your answer, to the nearest whole number, into the table.

(2 marks)

- 12 (a) **One** of the results that the scientist collected is anomalous.

Draw a ring around this result.

(1 mark)

- (b) Suggest a possible cause for the anomalous result.

.....

 (1 mark)

- (c) What was done about the anomalous result when the mean time was calculated?

.....

 (1 mark)

13 In this investigation, which was the **dependent** variable?

Put a tick (✓) in the box next to your choice.

- The number of drops of lipase used
- The volume of cooking oil used
- The time taken to reach pH 6.0
- The temperature of the water bath

(1 mark)

14 The scientist changed the volume of enzyme used by adding different numbers of drops of lipase.

(a) Explain why the use of drops is not a good way of controlling the volume of enzyme.

.....
.....

(1 mark)

(b) Explain how the scientist could have improved the method of controlling the volume of enzyme.

.....
.....
.....
.....

(2 marks)

15 In a report to the manufacturer, the scientist made the following claim.

In the past, washing clothes involved heating the water to high temperatures, 60 °C, so that the washing powder could dissolve the stains.

Using biological washing powders will reduce the cost of washing clothes.

Use information from this investigation and your own investigation to comment on this claim.

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.....

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(2 marks)

16 Non-biological washing powders do **not** contain enzymes.

A manufacturer claims that biological washing powder removes stains better than non-biological washing powder.

Describe how you could test this claim in the laboratory.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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(4 marks)

END OF QUESTIONS

There are no questions printed on this page