

Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

For Examiner's Use Total Task 1



General Certificate of Education  
Advanced Subsidiary Examination  
June 2011

## Biology

## BIO3X/PM1

### Unit 3X AS Externally Marked Practical Assignment Task Sheet 1

To be completed before Task Sheet 2.

For submission by 15 May 2011

**For this paper you must have:**

- a ruler with millimetre measurements
- a calculator.

## The effect of substrate concentration on the rate of the reaction catalysed by the enzyme chymosin

### Introduction

Casein is a protein found in milk. Chymosin is an enzyme which breaks some of the peptide bonds in casein. The product is an insoluble polypeptide which precipitates to form a solid white curd. When all the protein has been broken down the milk turns solid.

### Task 1

You will investigate the effect of substrate concentration on the rate of reaction catalysed by chymosin.

### Materials

You are provided with

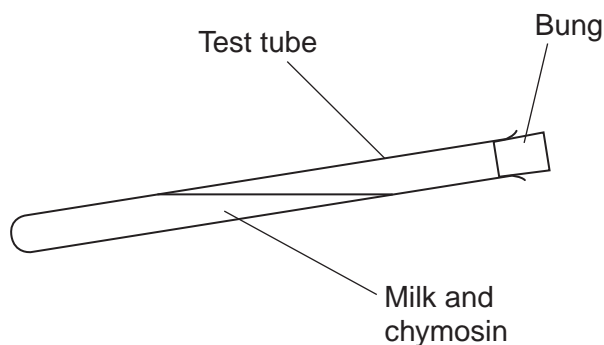
- milk
- chymosin solution
- Pasteur pipette
- test tubes
- bungs for test tubes
- test tube rack
- stop watch or timer
- pipettes or syringes

You may ask your teacher for any other apparatus you require.

### Outline Method

**Read these instructions carefully before you start your investigation.**

1. Add 5 cm<sup>3</sup> of milk to each of six test tubes.
2. Add 10 drops of chymosin solution to the milk in one tube and put a bung in the tube.
3. Hold the tube nearly horizontal as shown in the diagram. Keeping the tube nearly horizontal, gently mix the contents by rotating the tube several times.



4. Rotate the tube every 10 seconds.
5. Record the time taken for the first white curd to appear on the side of the tube.
6. Repeat steps 2–5 with the other tubes of milk so that you have six sets of data.
7. Record your results in the table provided.

**You will need to decide for yourself**

- when curd appears on the side of the tube.

**Recording your results**

Sample number	Time taken for curd to appear / seconds
1	
2	
3	
4	
5	
6	

**Turn over ►**

**Questions on Task 1**

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

- 1** You were told to rotate the tube every 10 seconds (Step 4). Give **two** reasons why you were told to rotate the tube.

1 .....

.....

2 .....

.....

(2 marks)

- 2 (a)** The time taken for the curd to appear on the side of the tube can be used as a measure of the rate of the reaction. Give **two** ways in which measuring the rate of the reaction in this way would make your results unreliable.

1 .....

.....

2 .....

.....

(2 marks)

- 2 (b)** Suggest **two** other ways of measuring the rate of the reaction.

1 .....

.....

2 .....

.....

(2 marks)

- 3** If you have carried out this experiment carefully, your data for the last three tubes may be more reliable than for the first three tubes. Explain why.

.....

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(1 mark)

**END OF TASK 1**