

Surname					Other Names				
Centre Number					Candidate Number				
Candidate Signature									

For Examiner's Use Total Task 1

General Certificate of Education  
June 2009  
Advanced Subsidiary Examination



**HUMAN BIOLOGY**  
**Unit 3X Externally Marked Practical Assignment**  
**Task Sheet 1**

**HB13X/PM1**

**To be completed before Task Sheet 2.**

**For submission by 15 May 2009**

**You must have**

- a ruler with millimetre measurements
- a calculator.

Cows' milk contains bacteria. The bacteria in fresh milk increase in number and produce waste products. These waste products affect the taste and smell of milk and eventually make it unsuitable for human consumption.

As the number of bacteria in a sample of milk increases, the concentration of oxygen in the milk decreases. A fall in the concentration of oxygen can be detected using a solution of resazurin. Resazurin changes colour depending on the concentration of oxygen. The colour change is gradual over the following range:

[high oxygen concentration]	blue → mauve → pink → pale pink → white	[low oxygen concentration]
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In this investigation, you will use resazurin to estimate the relative number of bacteria in samples of milk.

### **A      Setting up your investigation**

In this task, you are going to use resazurin to investigate whether there is a difference in the number of bacteria present in fresh milk and stale milk. You have to measure the time it takes for resazurin in a sample of milk to change from blue to pink. Pink is the end point for this investigation.

You are provided with

- samples of fresh milk and stale milk
- 0.005 % resazurin solution
- large beaker
- small beaker
- thermometer
- timer
- test tubes with bungs or caps
- test tube rack
- Bunsen burner
- tripod and gauze
- graduated pipettes or syringes
- marker pen

You may ask for any other apparatus you require.

You should read all these instructions carefully before you start work.

## **B Carrying out the investigation**

1. Set up a water bath at room temperature using the large beaker provided.
2. Label five test tubes 1 to 5.
3. Use clean pipettes to add 5 cm<sup>3</sup> fresh milk and 0.5 cm<sup>3</sup> resazurin solution to both tube 1 and tube 2.
4. Use clean pipettes to add 5 cm<sup>3</sup> stale milk and 0.5 cm<sup>3</sup> resazurin solution to both tube 3 and tube 4.
5. Use tube 5 to set up a control experiment.
6. Seal all tubes and place in the water bath. Start the timer.
7. In the third column of the table below, record the time taken for the milk in each tube to turn pink.
8. If at the end of your laboratory session the milk in any of the tubes has not turned pink, record its colour in the fourth column of the table below.

You will need to decide for yourself:

- how to monitor the temperature of the water in the water bath
- a suitable control experiment for this investigation.

## **C Recording your results**

Record your results in the table.

<b>Tube number</b>	<b>Contents of tube</b>	<b>Time taken for milk to turn pink / minutes</b>	<b>Colour of milk if it has not turned pink by end of session</b>
1	Fresh milk		pink
2	Fresh milk		pink
3	Stale milk		
4	Stale milk		
5	Control		

**Turn over ►**

**QUESTIONS ON TASK 1****Answer all questions in the spaces provided**

**1** The test tubes containing a mixture of milk and resazurin were left at room temperature.

(a) Describe how you monitored the temperature of the water in the water bath.

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

(b) Explain the advantage of using a water bath to maintain a constant temperature.

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

**2** All the test tubes were sealed during each experiment. Explain why.

.....  
.....  
.....  
.....  
(2 marks)

**3** (a) Describe your control experiment for this investigation.

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

**3** (b) Give the result of your control experiment and explain what the result shows.

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

- 4 Use your results to explain whether the use of resazurin is a suitable method for determining the relative number of bacteria in these milk samples.

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(2 marks)

- 5 (a) Are the data you collected for fresh milk quantitative? Explain your answer.

.....

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(1 mark)

- 5 (b) A colorimeter can be used to measure the amount of light that passes through a solution. In your investigation, the use of a colorimeter would not provide valid data. Explain why.

.....

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(1 mark)

**END OF TASK 1**

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