

## Exemplar Materials: Unit 8 Investigating the Scientist's Work

EXEMPLAR PORTFOLIO WORK: ASSIGNMENT 8							Commentary on Mark Allocation
Task 1 Plan for investigation: Calcium in Milk							
<p>The aim of the investigation is to find experimentally the amount of calcium in different kinds of milk and relate it to healthy eating.</p> <p>The plan for my investigation is shown below:</p>							<p>Limited aim</p> <p>Plan could be improved by adding columns for dates handed in and records on any changes needed and changes to plan.</p> <p>This will contribute to AO1 a. Realistic time allocation contributes to constraints.</p> <p>Student needs to fill in the plan throughout the complete investigation</p> <p>Any changes made should be recorded as the work proceeds.</p>
Action	Assesmt objective	Outcome	No. of weeks	No. of weeks taken	Start date	Target Finish date	
Selection of topic/outline of plan.	Task 1 AO1	Topic selected /start plan	0.5				
Research in literature and internet (more than one source needed).	AO1	Web sites listed Reference books listed with chapters and page numbers	0.5				
Practical methods. Risk assessments.	AO1	Suitability of experimental methods Practical work planned Risk assessment completed	1				
Completion of plan		Plan written up and submitted Equipment ordered Research checked	1				
Practical work <b>Specific details needed here</b> <b>Week 1</b> <b>Week 2</b> <b>Week 3</b> <b>Week 4</b>	Task 2a AO3	Practical trialled, modified and then: data obtained  Trials  Titration work	4				
Processing results	Task 2b	Results processed Errors calculated	2				
Report write up Evaluation	Task 2a		3				

I looked on the internet and found the following sources:  
**(list of sources) – with specific detail on websites and sections referred to.**  
**Text book references should also be included with indication of section used in this section.**

I carried out research on calcium in milk which included the following topics

- Calcium compounds in milk
- Different types of milk available
- Use of calcium in the body
- Experimental methods of finding the amount of calcium in milk

The amount of calcium as  $\text{Ca}^{2+}$  can be found by carrying out titrations using a solution of a compound called ethylenediaminetetraacetic acid or EDTA for short.

The indicator "Eriochrome Black or EBT for short can be used. There must be a buffer of pH 10 present.

Practical work

25cm<sup>3</sup> samples of different types of milk such as full fat, semi-skimmed, skimmed, goat's milk, soya milk, and any others that I think is interesting and that are cheap to buy.

As I am doing a titration, I shall need a burette, a 25 cm<sup>3</sup> pipette and a pipette filler, a white tile and some conical flasks. For the samples of milk I shall need more 25cm<sup>3</sup> pipettes.

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### Chemical Hazard notes

The disodium salt of edta is harmful. Contact with skin and eyes should be avoided

The buffer solution of pH 10 is corrosive. Avoid breathing vapours. Use in fume hood.

Eriochrome Black T is an irritant and should not be allowed to come in contact with the skin.

### Safety considerations

- The usual precautions when handling glassware for a titration should be observed.
- Pipette fillers should be used
- Safety glasses and gloves must be worn.

I shall have to do a rough titration so that I know what the colour change at the titration end point is.

Titration are very accurate if I take care.

Range and detailed information about sources will determine which Mark Band is the maximum for AO1b. Also evidence of use throughout the investigation; 3 sources is the minimum for Mark Band 2 to be awarded.

More detailed summarised research needs to be included for Mark Band 2.

Work presented: Mark Band 1, 2 marks

Apparatus must be that usually available.

Apparatus must be of suitable accuracy.

This covers AO1b Mark Band 1 for the Health and Safety aspect.

This plan is achievable and it is logically presented. A sound knowledge and understanding of the aims and objectives is shown. Mark Band 1, 2 marks.

From the sources of information,

EDTA reacts with  $\text{Ca}^{2+}$  in a 1:1 ratio.

If I know the molarity and the volume of the EDTA solution, I can calculate the number of moles of  $\text{Ca}^{2+}$  in  $25 \text{ cm}^3$  as

$$\begin{aligned} \text{No. of moles } \text{Ca}^{2+} &= \text{No. of moles of EDTA used} \\ &= \frac{\text{Volume of EDTA in } \text{cm}^3 \text{ used} \times \text{Molarity}}{1000} \end{aligned}$$

As the amount of Calcium in the various milks used is given in mg/100 ml in the nutrition data on the milk carton, I shall have to multiply my answer by 4 to get it in /100ml

And then I shall have to multiply by 40 to convert moles of calcium into a mass and then I shall have to multiply by 1000 to get mg.

The possible errors are:

Not having a sharp end-point

For Mark Band 3, there should be some discussion about constraints such as the opaqueness of milk making the end point difficult to detect.

Or the fact that laboratory work can only be done on certain days.