EXPERIMENT NO. 1

FA 4 is an impure sample of hydrated calcium chloride, $CaCl_2.2H_2O$. On heating, hydrated calcium chloride loses its water of crystallisation.

$$CaCl_2.2H_2O(s) \rightarrow CaCl_2(s) + 2H_2O(g)$$

You will determine the purity of **FA 4** by measuring the loss in mass that occurs when it is heated. The impurity present in **FA 4** is not decomposed on heating.

(a) Method

You should read the instructions carefully before starting any practical work and draw a table for your results in the space below.

- Weigh a crucible and record its mass.
- Add between 1.80 g and 2.00 g of **FA 4** into the crucible.
- Reweigh the crucible and its contents and record the mass.
- Place the crucible on the pipe-clay triangle and heat gently for 1 minute and then strongly for a further 2 minutes.
- Allow the crucible and its contents to cool. Reweigh the crucible and contents and record the mass.
- Heat the crucible strongly for a further 2 minutes. Allow it to cool. Reweigh the crucible and contents and record the mass.
- Repeat the heating, cooling and weighing until you are satisfied that all the water of crystallisation has been removed.
- Calculate and record the mass of **FA 4** used and the total mass of water lost.

I	
II	
III	
IV	
V	
VI	

[6]

(b) Calculations

Show your working and appropriate significant figures in the final answer to **each** stage of your calculations.

(i) The percentage loss in mass on heating is defined as

$$\frac{\text{the loss in mass on heating}}{\text{the original mass}} \times 100.$$

Calculate the percentage loss in mass of **FA 4**.

percentage loss in mass = ... %

(ii) Calculate the percentage loss in mass when **pure** hydrated calcium chloride, $CaCl_2.2H_2O$, is heated.

percentage loss in mass = ... %

(iii) Use your results to **(i)** and **(ii)** to calculate the percentage purity of **FA 4**, impure $CaCl_2.2H_2O$.

percentage purity = ... %

[3]

(c) A student carried out this experiment using 2.60 g of **FA 4**.

Suggest whether this experiment would give a more accurate result for the percentage purity of **FA 4**. Explain your answer.

....

.... [1]

(d) In your calculations you assumed that the impurity in **FA 4** does not decompose on heating.

State how the percentage purity that you calculated in **(b)(iii)** would change if the impurity were to decompose on heating.
Explain your answer.

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.... [1]

[Total: 11]