

EXPERIMENT NO. 1

FA 4 is an impure sample of hydrated calcium chloride, $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$. On heating, hydrated calcium chloride loses its water of crystallisation.



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 1.80g and 2.00g 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.

mass of empty crucible /g	26.45
mass of crucible + FA4 /g	28.35
mass of FA4 before heating /g	1.90
mass of crucible + FA4 after heating /g	28.15
mass of crucible + FA4 after 1 st reheating /g	28.08
mass of crucible + FA4 after 2 nd reheating /g	28.07
mass of FA4 after heating /g	1.62
mass of water lost /g	0.28

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[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

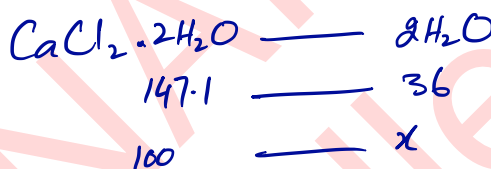
$$\frac{\text{the loss in mass on heating}}{\text{the original mass}} \times 100.$$

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

$$\frac{0.28}{1.90} \times 100$$

percentage loss in mass = 14.74 %

(ii) Calculate the percentage loss in mass when **pure** hydrated calcium chloride, $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$, is heated.



percentage loss in mass = 24.47 %

(iii) Use your results to (i) and (ii) to calculate the percentage purity of **FA 4**, impure $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$.

$$\frac{14.74}{24.47} \times 100$$

percentage purity = 60.2 %
[3]

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

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

Yes, as there will be less percentage error in weighing mass. [1]

OR

NO, because there is more water to be lost so more spitting and frothing so percentage error in mass lost will be greater.

(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.

There would be the greater loss of mass therefore percentage purity would increase. [1]

[Total: 11]

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