

EXPERIMENT NO. 6

- 2 You will now investigate a different hydrated salt with the formula $\text{MSO}_4 \cdot 7\text{H}_2\text{O}$, where **M** is a Group 2 metal. By heating a sample of $\text{MSO}_4 \cdot 7\text{H}_2\text{O}$ to produce anhydrous MSO_4 you will determine its relative formula mass and hence identify **M**.

FB 4 is the hydrated salt $\text{MSO}_4 \cdot 7\text{H}_2\text{O}$.

(a) Method

- Weigh the crucible with its lid. Record the mass.
- Place between 1.80 g and 2.20 g of **FB 4** in the crucible.
- Reweigh the crucible, its lid and contents and record the mass.
- Without the lid, place the crucible on the pipe-clay triangle and heat gently for approximately 1 minute and then strongly for approximately 4 minutes.
- Place the lid on the crucible and leave it to cool.
- Reweigh the crucible, its lid and contents and record the mass.
- Calculate, and record, the mass of **FB 4**, the mass of residue after heating and the mass of water lost.

[4]

(b) Calculations

- (i) Calculate the number of moles of water lost when your sample of $\text{MSO}_4 \cdot 7\text{H}_2\text{O}$ was heated.

moles of water = mol [1]

- (ii) Write the equation for the reaction that occurs when $\text{MSO}_4 \cdot 7\text{H}_2\text{O}$ is heated. Include state symbols.

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Deduce the number of moles of anhydrous salt, MSO_4 , left after the heating.

moles of MSO_4 = mol
[1]

(iii) Calculate the relative formula mass, M_r , of $\text{MSO}_4 \cdot 7\text{H}_2\text{O}$.

$$M_r \text{ of } \text{MSO}_4 \cdot 7\text{H}_2\text{O} = \dots\dots\dots [1]$$

(iv) Determine the relative atomic mass, A_r , of **M** and hence identify **M**.
Show your working.

$$A_r = \dots\dots\dots$$

M is $\dots\dots\dots$
[2]

(c) (i) In the method used above, the lid was placed on the crucible when the crucible was left to cool.

Explain why the lid was placed on the crucible.

$\dots\dots\dots$
 $\dots\dots\dots$ [1]

(ii) Suggest and explain the effect on the calculated value of the relative atomic mass of **M** if the lid had not been placed on the crucible during cooling.

$\dots\dots\dots$
 $\dots\dots\dots$ [1]

[Total: 11]