## **EXPERIMENT NO. 7**

2 In this experiment you will determine the value of x in the formula for hydrated manganese(II) sulfate, MnSO<sub>4</sub>•xH<sub>2</sub>O, where x is an integer. You will do this by measuring the mass lost when a sample of hydrated manganese(II) sulfate is heated.

 $MnSO_4 \cdot xH_2O(s) \rightarrow MnSO_4(s) + xH_2O(g)$ 

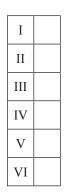
**FA 4** is hydrated manganese(II) sulfate, MnSO<sub>4</sub>•xH<sub>2</sub>O.

- (a) Method
  - Weigh the crucible with a lid and record the mass.
  - Add all the **FA 4** to the crucible.
  - Reweigh the crucible with the lid and FA 4. Record the mass. Describe the appearance of FA 4.

appearance of FA 4 .....

- Place the crucible in the pipe-clay triangle on top of the tripod.
- Heat the crucible **gently** with the lid on for approximately 1 minute.
- Remove the lid and then heat more strongly for a further 4 minutes.
- Replace the lid and allow the crucible to cool.
- Once the crucible has cooled, reweigh the crucible with the lid and contents. Record the mass.
- Calculate and record the mass of **FA 4** added to the crucible, the mass of the residue and the mass of water lost.
- Describe the appearance of the residue.

appearance of the residue .....



[6]

## (b) Calculations

(i) Calculate the number of moles of manganese(II) sulfate present in the residue. You may assume all the water of crystallisation has been removed.

moles of  $MnSO_4$  = ..... mol [1]

(ii) Calculate the number of moles of water lost.

moles of water lost = ..... mol [1]

(iii) Calculate the value of x in  $MnSO_4 \cdot xH_2O$ .

(c) It is possible that **FA 4** did not lose all of the water of crystallisation in your experiment.

(i) Explain how you could modify the experiment to ensure all water has been removed.

......[1]

(ii) Explain why your calculated value of x might not change if a small amount of water of crystallisation remained in the residue.

......[1] [Total: 11]