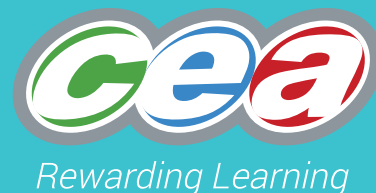


GCSE



CCEA GCSE TEACHER GUIDANCE  
**Double Award Science**  
**Practical Manual**

Unit 7: Practical Skills

C5: Determine the mass of water  
present in hydrated crystals



## Determine the mass of water present in hydrated crystals

A solid which is hydrated contains 'water of crystallisation'. This is water which is 'chemically combined' in the crystal structure. If we heat a hydrated solid gently, the water will be released and the solid will lose mass. In this experiment you will heat hydrated iron(II) sulfate crystals. By carefully heating the crystals and recording mass measurements, we can calculate the mass of water in the supplied crystals.

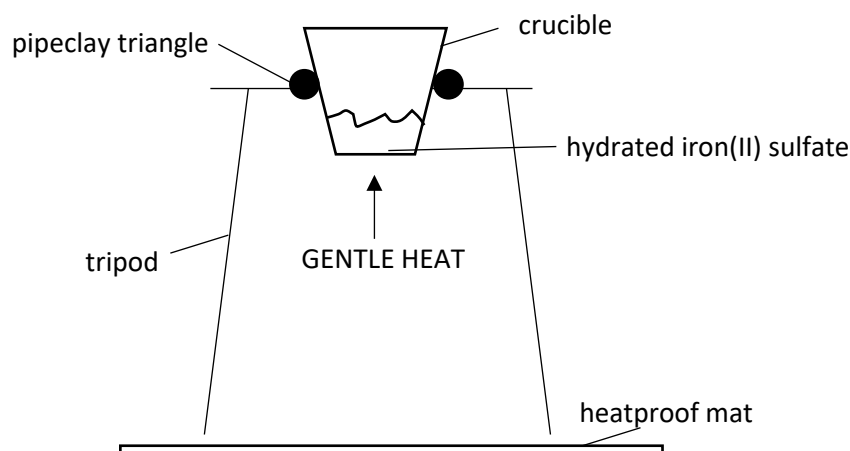
To carry out this practical, each group will need:-

- Hydrated iron(II) sulfate,  $\text{FeSO}_4 \cdot x\text{H}_2\text{O}$  (1.30 g – 1.50 g)
- Spatula
- Weighing bottle
- Bunsen, tripod and pipe clay triangle
- Heat-proof mat
- Crucible
- Tongs
- Electronic balance

### Safety considerations

- Gentle heating should be carried out to reduce risk of  $\text{FeSO}_4$  decomposing, use a well-ventilated lab
- Iron(II) sulfate is harmful
- Wear safety goggles
- Take care when heating, all apparatus will become very hot

### Apparatus



## Method

1. Weigh a crucible, record this mass value in your results table.
2. Add between 1.30 g and 1.50 g of hydrated iron(II) sulfate crystals,  $\text{FeSO}_4 \cdot x\text{H}_2\text{O}$ . Reweigh the crucible, and record the new mass in the results table.
3. Place the crucible containing the hydrated iron(II) sulfate crystals on the pipe clay triangle and gently heat for two minutes. You should avoid the formation of brown iron(III) oxide if possible.
4. Allow to cool and weigh the crucible and its contents, record the mass.
5. Reheat the crucible and its contents and reweigh, record the new mass.
6. Continue reheating and reweighing until constant mass is observed. This process is known as 'heating to constant mass' and ensures that all the water of crystallisation has been removed from the hydrated crystals.

## Results table

Reading	Mass (g)
Mass of empty crucible	
Mass of empty crucible and crystals	
Mass after 1 <sup>st</sup> heating	
Mass after 2 <sup>nd</sup> heating	
Mass after 3 <sup>rd</sup> heating	
Mass after 4 <sup>th</sup> heating	

## Analysis of data

Mass of hydrated crystals \_\_\_\_\_ g

Mass of anhydrous crystals \_\_\_\_\_ g

Mass of water of crystallisation \_\_\_\_\_ g