

WJEC Chemistry GCSE

Specified Practical 11

Determining the Formula of a Hydrated Salt

[Methods are adapted from the [Royal Society of Chemistry](#)]

England Specification





Water of Crystallisation

Water is held as part of a crystal structure. In this method, a known mass of hydrated copper(II) sulfate is heated to remove this water.

Aim

To use a method of weighing by difference, to determine the percentage of water in a hydrated salt.

Equipment

- Crucible
- Crucible tongs
- Tripod
- Pipe-clay triangle
- Bunsen burner
- Heat resistant mat
- Top-pan balance ($\pm 0.01\text{g}$)
- Hydrated copper(II) sulfate crystals

Method

1. Weigh the empty crucible, and then into it weigh 2 - 3 g of hydrated copper(II) sulphate. (Make sure that you record all your weighings accurately to the nearest 0.01g).
2. Place the crucible securely within the pipe-clay triangle on the tripod over the Bunsen burner.
3. Gently heat the crucible and contents. The blue colour of the crystals will fade. You will be left with a greyish-white substance (anhydrous copper(II) sulfate). It's important that you don't overheat, as this can result in further decomposition. If you start to see a black-ish colour forming stop heating immediately.
4. Allow the crucible and contents to cool.
5. Use the tongs to move the crucible from the pipe-clay triangle onto the heat resistant mat where it should cool more rapidly.
6. Re-weigh the crucible and contents once cold.





Calculation

1. Work out the molar masses of H_2O and CuSO_4 .
(Relative atomic masses: $\text{H}=1$, $\text{O}=16$, $\text{S}=32$, $\text{Cu}=64$)
2. Calculate the mass of water lost and the mass of anhydrous copper(II) sulfate formed in your experiment.
3. Then, calculate the number of moles of anhydrous copper(II) sulfate you have formed.
4. Calculate the number of moles of water lost.
5. Calculate how many moles of water would have been evaporated if you had formed 1 mole of anhydrous copper(II) sulfate.
6. From this, work out the formula for hydrated copper(II) sulfate.

Diagram

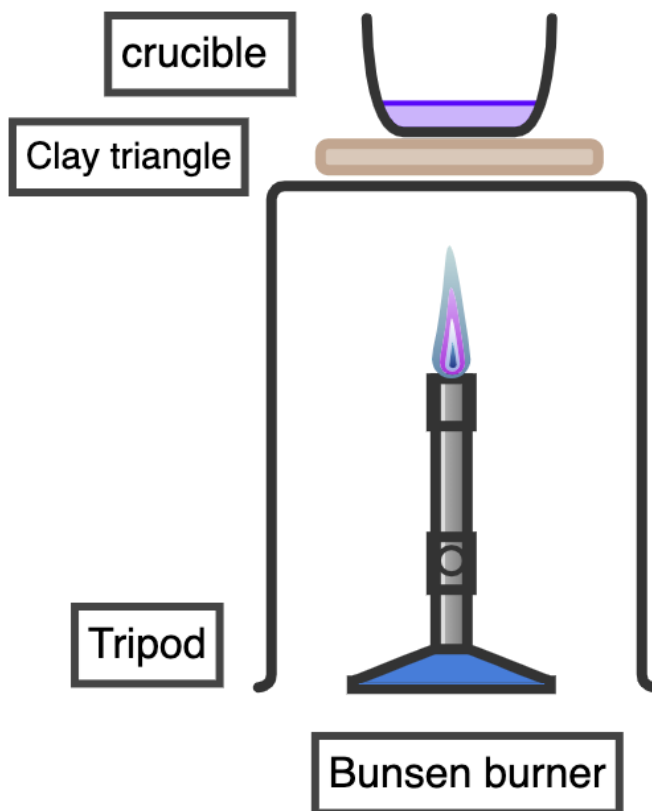


Image created in: [Chemix](#)



Safety Precautions

- Hydrated copper(II) sulfate is harmful and dangerous for the environment.
- Crucibles can be of porcelain and could smash easily.
- Be careful of hot equipment.
- Tie back long hair and wear eye protection.

