

# Heating Copper Sulphate Lab

In this lab, students will investigate the changes that occur when hydrated copper sulphate is heated.

## Science 9

Curriculum Connection:

BC Science 9 (2016)

Element properties as organized in the Periodic Table.

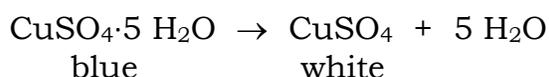
The arrangement of electrons determines the compounds formed by elements.

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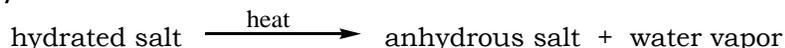
## Heating Copper Sulphate Lab

Hydrates are crystalline solids that contain a fixed number of water molecules as an integral part of their crystalline structure. The number of water molecules bound per metal ion is often characteristic of that particular metal ion. One of the more common hydrates is copper(II) sulfate pentahydrate, which contains 5 moles of water per 1 mol of copper(II) sulfate, written as  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ . It is used as a catalytic precursor, fungicide, and as a source of copper in chemical manufacturing processes. Epsom salt is magnesium sulfate heptahydrate,  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ . Epsom salt is used to reduce inflammation when applied externally.

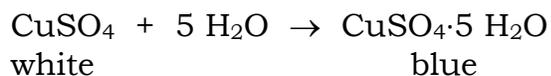
Many hydrates can be transformed to the anhydrous compound when heated strongly. For example, copper sulfate pentahydrate can be converted into anhydrous copper sulfate. This change can be followed visually. The blue crystalline copper sulfate pentahydrate is converted when heated to a white, powdery, anhydrous salt, according to:



Or generally



It is also possible to reverse the above process, as shown in the equation below:



If water is added to the white anhydrous copper sulfate, a blue color is obtained indicating that the blue pentahydrate is regenerated. The property of reversibility can be used to distinguish true hydrates from other compounds that produce water when heated.

**Objective:**

To observe the changes that occur to hydrated Copper Sulphate when it is heated with a Bunsen burner.

**Materials:**

Bunsen Burner

Crucible

Copper Sulphate

Clay Triangle

Stand/Clamp

Tongs

Ceramic Fibre Heat Mat

Goggles

Water Bottle

**Procedure:**

1. Set up the stand, clamp and ceramic triangle
2. Place 1cm depth of copper sulphate in the bottom of the crucible
3. Place the crucible on the copper triangle.
4. Light the Bunsen burner and turn it to a roaring blue flame.
5. Adjust the height of the crucible, so that the bottom of the crucible is at the top of the blue cone in the flame.
6. Place the lid on the crucible and heat for 5 minutes.
7. After 5 minutes, remove the Bunsen burner and lift the lid with the tongs.
8. Record your observations.
9. Replace the lid and heat for another 5 minutes.
10. Turn off the Bunsen burner and allow everything to cool for 10 minutes.
11. When the crucible is cool, remove the lid and record your observations.
12. Add a few drops of water to the crucible and record your observations.
13. Clean your equipment and return to where you got it from.