

Percent Composition of a Hydrated Crystal  
And  
Empirical Formula of a Hydrate

**Background:** Some solids naturally absorb water from the air to form hydrates. Formulas for the hydrated crystals are written in the following style:  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$ . This means that for every one formula unit of barium chloride there are two water molecules incorporated into the crystal structure. The water molecules are physically attached.

**Purpose:** To determine the percent water in a hydrated crystal of copper (II) sulfate and then determine its empirical formula.

**Materials:** Balance, Crucible and Lid, Ring Stand, Ring, Clay Triangle, Hydrated Copper (II) Sulfate, Burner.

**Procedure:** You Decide --- but **do not heat the crystal for more than 5 minutes.**

**DATA:** Make a DATA TABLE in your LAB BOOK that includes the THREE pieces of necessary raw data.

**Calculations and Conclusion**

1. Show the work necessary to find the percent water.
2. Show the work necessary to find the empirical formula (find the ratio of moles of water to moles of Copper (II) Sulfate)
3. Calculate the known percent water.
4. Calculate % error (on percent water)
5. Three paragraphs typewritten: 1. Explain the lab procedure and 2. how you determined the percent water and 3. how you determined the empirical formula.
6. Do an error analysis regarding your determination of the % water.

Dry Lab Data:

Mass of Crucible:	12.25 grams
Mass of Crucible and Hydrated $\text{CuSO}_4$	16.42 grams
Mass of Crucible and anhydrous $\text{CuSO}_4$	13.63 grams