HYDRATES - Ionic compounds (salts) that have a specific amount of water attached or included in their ionic structure. When heated sufficiently, this water will be released. After the water has evaporated, the remaining compound is called the anhydrous salt.

Hydrate anhydrous salt + water

\*\**NOTE*\*\* *anhydrous = no water*

*Example:* Na2CO3 **.** 10 H2O (sodium carbonate decahydrate)

* In this laboratory, you will be finding the percent of water in copper (II) sulfate hydrate.
* Measuring the mass of the hydrate before evaporating the water and the mass of the anhydrous salt left behind after the water has evaporated will help you determine the mass of water contained in your original sample.
* Knowing the mass of water in the original sample, it is fairly simple to calculate the percent of water in the compound:

% H2O = mass H2O x 100

mass hydrate

* The evaporation will also cause a color change from the blue hydrate to a white anhydrous salt. The specific reaction is listed below:

CuSO4 *• x*H2O CuSO4 + xH2O

* You must determine the value of *x*, by calculating the percent composition for the hydrate.

PROCEDURE

1. Prepare the setup as shown by your instructor
2. Heat the evaporating dish on the hot plate for 3 minutes.
3. Using crucible tongs, carefully remove the dish from the apparatus. \*Place it on an insulated pad to prevent it from cooling too fast and **breaking**. Allow to cool for 2 minutes.
4. While waiting for your dish to cool, create a data table in the space below to record your measurements during this lab.
5. Record the mass of the evaporating dish.
6. With the evaporating dish on the balance, carefully measure into it about 2.00g copper (II) sulfate hydrate. Record the data in data table.
7. Place the evaporating dish back on the hot plate. Avoid any popping or spattering.
8. Heat strongly for 5 minutes, or until the blue color has disappeared. During heating, a spatula may be used to spread the solid and break up any caked pieces of hydrate.
9. *If the edges of the solid appear to be turning brown, remove the heat momentarily and resume heating at a gentler rate.*
10. Carefully place the evaporating dish on the insulating pad and allow the evaporation dish to cool for 1 minute.
11. Immediately measure the mass of the evaporating dish and record data in table.

DATA:

Post lab Calculations/Questions:

**Answer in complete sentences and SHOW ALL WORK!**

1. Find the mass of hydrate used.
2. What color was the anhydrous salt?
3. Determine the mass of the anhydrous salt.
4. Find the number of moles of anhydrous salt
5. Find the mass of the water lost (evaporated).
6. Find the number of moles of the water lost (evaporated).
7. Find the percent of water in the hydrate.
8. Determine the value of x in the formula CuSO4\*xH2O.
9. Given that the true % water for copper (II) sulfate is 36.0%, calculate your experimental error.
10. Why must the mass of the anhydrous salt be measured immediately upon cooling?