**Determination of % Water in a Hydrate**

**Discussion:**

In this lab you will determine the % of water in a hydrate.  You will then determine the chemical formula of an anhydride salt. This will be done by removing the water from the hydrate by heating the hydrate.  The mass of water driven off will be determined.  From the mass of water given off and the initial mass of the hydrate the % of water in the hydrate will be calculated.

Use the greek prefixes to identify the number of waters in the hyrdrate sample:

**calcium chloride dihydrate**

**Safety:**

1.        Wear safety goggles!

2.        ***Always*** handle the crucibles with hot hands.  There is a considerable ***burn hazard*** involved in using crucibles because a **hot crucible** looks exactly like a **cold crucible**.

3.        Be sure to allow crucible to **cool** for about **5 minutes** after heating is completed.

**Procedure:**

1.        Find the mass (to **4 decimal places**) of your dry empty crucible (without lid) and record in the data table. (a.)

2.        Place your sample in the crucible and determine the mass (to 4 decimal places) of the crucible and sample and record this in the data table. (b.)

3.        Place the crucible with sample on the hot plate and heat for about 10 minutes. During this time, calculate the molar mass of cupric sulfate and water. (g. and h.)

4.        Allow sample to cool for 5 minutes. (Do not worry about water returning to the sample, this anhydrous sample is not very hygroscopic.)

5.        Once the crucible is cool, determine the mass of the anhydrous sample and record in the data table. (c.)

6.        Clean the crucible in the sink (notice how the crucible gets hot with the addition of a few drops of water).

**Data Table:**

a. Mass of dry crucible:                                                                                                   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ g

b. Mass of crucible and hydrate:       \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_g

c. Mass of crucible and anhydrous sample:

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ g

**Calculations:**

d. Calculate mass of hydrate (show calculation below):                                                \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ g

e. Calculate mass of anhydrous salt (show calculation below):                                \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ g

f. Calculate the mass of water driven off (show calculation below):    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ g

g. Calculate the molar mass of cupric sulfate : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ g/mol

h. Calculate the molar mass of water: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ g/mol

**Analysis:**
Part #1: Percent Compositon

Calculate % water in the sample (show calculation below):                                     \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ %

Part #2: Determination of Chemical formula of the hydrate (similar to determining an empirical and molecular formula):
\* NOTE: You could use the percentage calculated above, or the masses form the front. Either way, show your work and include proper labels.

1. Determine the moles of anhydrous cupric sulfate \_\_\_\_\_\_\_\_\_\_\_\_\_\_ moles

(Show work below)

2. Determine the moles of water driven off \_\_\_\_\_\_\_\_\_\_\_\_\_\_ moles

(Show work below)

3. Compare the moles of water to the moles of anhydrous cupric sulfate to determine the chemical formula:
(Show work below)

Name: cupric sulfate \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ hydrate
 (use greek prefixes)

Chemical Fromula: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_∙\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

4. If the molar mass of the hydrate is 259.677 g/mol, determine the molecular formula: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
(show work below)