

Name: \_\_\_\_\_

### FORMULA OF A HYDRATE

When water molecules are covalently bonded to ionic solids, the resulting compound is called a hydrate. An example of a hydrate is *Plaster of Paris*,  $\text{CaSO}_4 \cdot \text{H}_2\text{O}$ . When water is added to *Plaster of Paris* and the material is allowed to set, it is gradually transformed into a hard crystalline compound,  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ . This is the material of plaster casts. The difference in composition between *Plaster of Paris* and the plaster in casts is directly associated with the different degree of hydration of the calcium sulphate in the two cases.

The water molecules are not as tightly bound as the ions are. The water can usually be driven off by heating the crystals in a burner flame. The material that remains after the water has been removed is called an anhydrous salt.

#### Objectives:

1. To observe the affect of heat on a hydrate.
2. To determine the percentage of water of hydration for hydrated copper (II) sulphate.
3. To determine how many water molecules are arranged around a molecule of copper (II) sulphate.

#### Materials:

Make a list of all the materials used in the experiment.

#### Procedure:

Follow procedures 1-8 on pgs. 62-63 of your lab manual. You can write "See lab text pg. 62-63" in your report.

#### Data:

Table 1: Mass data of hydrate

	Mass (g)
Empty Crucible	
Crucible and Hydrate	
Hydrate Used	
Crucible and Contents after first heating	
Crucible and Contents after second heating	
Anhydrous Compound	
Water lost by heating	

Sample Calculations:

Show a sample calculation for each type of calculation done in your lab.

Questions:

1. Calculate the percent composition of water in the hydrate using your results.
2. Use your answer from #1 to give the chemical formula of the hydrate. (i.e. – how many water molecules in the hydrated copper (II) sulphate?)
3. Use the internet to find the proper formula for hydrated copper (II) sulphate.
4. Do your answers from #2 and #3 compare? Why or why not? (i.e. – were there errors or inaccuracies in your experiment?)
5. From your results, how do you know the anhydrous and hydrated copper (II) sulphate compounds are different substances?

Conclusion:

Comment on objectives 1, 2, and 3.