

### 3 • Molecules and Compounds

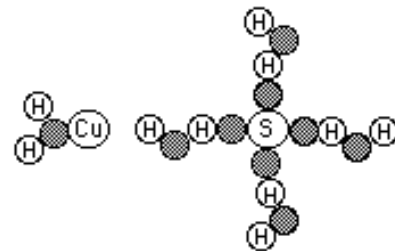
#### HYDRATE DEMONSTRATION EXPERIMENT

Cupric sulfate,  $\text{CuSO}_4$  is a **hydrate**, that is, there are water molecules incorporated into the solid. Circle the water molecules on the right.

How many do you see? \_\_\_\_\_

Cupric sulfate has the formula,  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ .

It is named **cupric sulfate pentahydrate**.



Calculate the **mass** of  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  \_\_\_\_\_ Notice that the “·” means “attached” not “multiply by”.

What is the **percent water** in the hydrate? \_\_\_\_\_ Justify your answer below with a calculation.

This percent can be determined **experimentally** by heating the hydrate. The water molecules will leave as steam. What is the appearance of cupric sulfate pentahydrate? \_\_\_\_\_

We will heat the cupric sulfate in a **crucible** (a porcelain cup that can be heated red-hot without breaking). Draw the heating set-up used in this demonstration.

#### DATA

mass of clean, dry crucible: \_\_\_\_\_  $\pm 0.01$  g  
 mass of crucible + solid: \_\_\_\_\_  $\pm 0.01$  g  
 mass of crucible & solid after heating 1: \_\_\_\_\_  $\pm 0.01$  g  
 mass of crucible & solid after heating 2: \_\_\_\_\_  $\pm 0.01$  g  
 mass of crucible & solid after heating 3: \_\_\_\_\_  $\pm 0.01$  g

#### CALCULATIONS

What is the mass of the original solid? \_\_\_\_\_

What mass of water vaporized? \_\_\_\_\_

What was the **experimental** % of water in the hydrate? \_\_\_\_\_

What is the **percent error** in the **experimental** percentage of water compared to the **calculated** percentage of water? \_\_\_\_\_

#### QUESTIONS

What is the appearance of the **anhydrous** cupric sulfate? \_\_\_\_\_

Why was the crucible heated again and again?

Why was the crucible allowed to cool before being massed?

When you know about **moles**, calculate the following:

	mass	molar mass	moles	ratio of moles
cupric sulfate pentahydrate				
water				
anhydrous cupric sulfate				1