**Name: DATA**

**Purpose:** To determine the formula of a hydrate based on the % H2O present. In other words, your task is to determine the coefficient n for the hydrate.

**Reaction:** $CuSO\_{4} •n H\_{2}O \genfrac{}{}{0pt}{}{heat}{-\rightarrow } CuSO\_{4}+n H\_{2}O $

**Safety:**

* Goggles should be worn at all times!
* Horseplay will NOT be tolerated!
* Be careful hotplate!
* Evaporating dish will become VERY HOT during heating. Crucibles are also very fragile and must be handled carefully with tongs. (You break it, you buy it! An evaporating dish costs $10.00.)
* **DO NOT PLACE HOT CRUCIBLES ON A BALANCE!**

**Procedure:**

1. Make sure that your evaporating dish is clean, dry, and cool.
2. Turn on your hot plate to the *maximum level*. BE CAREFUL with the hotplate while it’s heating up!
3. Place your evaporating dish on the **TRIPLE BEAM BALANCE** (NOT on hotplate) and determine its mass (record this mass on line A of Table 1). Remember to zero out the triple beam balance to get the correct mass.
4. Keep the evaporating dish on the balance and measure out *approximately* 1.0g -1.5g of the blue hydrated salt. This is only an approximation, so you do not have to be exactly at 1.0 or 1.5.
5. Record the total mass of evaporating dish + the hydrated salt on line B. This is the mass before you have heated the salt.
6. Now determine the approximated mass of the measured hydrated salt by taking the difference of

line A and line B. Record this mass on line C.

1. CAREFULLY, transfer the evaporating dish that is filled with your hydrated salt to the hotplate. The hotplate should be very hot by now.
2. Once you have placed the evaporating dish on the hotplate, START your timer.
3. To completely dehydrate the water from this salt, it should take anywhere between 7-10 minutes. A GOOD INDICATOR for when this reaction is complete is the hydrated salt is NO LONGER BLUE.
4. The hydrated salt should look *white or very pale light blue* at the end of this reaction. TURN OFF HOTPLATE!
5. Once the reaction is done, using the tongs provided, CAREFULLY place the evaporating dish on the lab bench. DO NOT PUT IT ON THE BALANCE JUST YET!
6. Let the evaporating dish cool before putting it on the balance. This should take about 5 minutes.
7. After 5 minutes, you can move the evaporating dish (with tongs) and place it on the triple beam balance.
8. Record the new mass of the evaporating dish + dehydrated salt on line D of Table 1.
9. Finally, determine the mass of the dehydrated salt by taking the difference of line A and line D. Record this mass on line E of Table 1.
10. COMPLETELY clean up your station. Rinse out the evaporating dish and dry. Clean up and salt crystals that remains.

Table 1. Masses

|  |  |
| --- | --- |
| 1. **Mass of EMPTY evaporating dish**
 | 42.0 g |
| 1. **Mass of evaporating dish + hydrated salt (before heating)**
 | 43.7g |
| 1. **Mass of ONLY hydrated salt**
 |  |
| 1. **Mass of evaporating dish + dehydrated salt (after heating)**
 | 42.8g |
| 1. **Mass of anhydrous (dehydrated) salt**
 |  |

**Results:**

*Using data Table 1, determine the coefficient of* ***n*** *for the following hydrate:* CuSO4 • ***n***H2O

***YOU MUST SHOW ALL WORK TO RECEIVE FULL CREDIT!!!***

1. First, determine the mass (in grams) of WATER LOST during the reaction. You can calculate this by taking the mass of the dehydrated salt and subtracting it from the mass of the hydrated salt (The difference of line C and line E). Show your work below!
2. Now taking the mass of water from problem 1, convert it to moles of water. You can do this by using dimensional analysis as taught to you. Convert g 🡪 mol. (Molar mass H2O = 18.02 g/mol)
3. Do the same thing but for the mass of the DEHYRATED SALT. Take the mass from line E and convert it to moles. Convert g 🡪 mol. (Molar mass CuSO4 = 159.61 g/mol)
4. Using your answers from problem 2 and 3 determine the coefficient ***n*** for CuSO4 • ***n***H2O. Use the formula : $n= \frac{mol of water}{mol of anhydrous(dehyrated) salt}$
5. What is the complete formula of this hydrate?