

## HYDRATES DATA SHEET

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

**I. Hydrate test - Observations**A. Copper Sulfate:  $\text{CuSO}_4$ 

1. Before heating \_\_\_\_\_
2. After heating \_\_\_\_\_
3. Conclusions \_\_\_\_\_

## B. Cobalt Chloride

1. Before heating \_\_\_\_\_
2. While heating \_\_\_\_\_
3. After heating \_\_\_\_\_
4. After adding water \_\_\_\_\_
5. Conclusion \_\_\_\_\_

**II. Percent of Water in a Hydrate:  $\text{MgSO}_4$** You have a *minimum* of 4 masses to measure:

Descriptions	Mass Labels	Your Measured Masses
Mass of empty, dry crucible + cover	M1	
Mass of crucible + cover + sample BEFORE heating	M2	
Mass of crucible + cover + sample AFTER first heating (5 min gentle + 10 min intense), AND cooling to RT	M3	
Mass of crucible + cover + sample AFTER second heating (5 min intense), AND cooling to RT	M4	
M3 and M4 must agree within 0.01 g! <i>If not</i> , heat and cool again, and record another mass of crucible + cover + sample AFTER third heating AND cooling to RT!	M5	

Now use those masses to calculate these values.

Descriptions	How to Use Value Labels	Your Calculated Values
Initial hydrated sample mass	M2 - M1	C1= _____ g
Anhydrous sample mass	Final M (M4 OR M5) - M1	C2= _____ g
Mass of $\text{H}_2\text{O}$ lost	C1-C2	C3= _____ g
Moles of anhydrous $\text{MgSO}_4$	C2 g/(120.366 g/mol)	C4= _____ mol
Moles of water lost	C3 g/(18.015 g/mol)	C5= _____ mol
Ratio of mol water : mol $\text{MgSO}_4$	C5/C4	C6= _____ : 1
Molecular formula of hydrate	Use C6 in formula	
Name of hydrate		

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### Review Questions

1. Show how to calculate the molar mass of water.
2. What is a good use of cobalt chloride, since it changes depending on its hydration level?
3. Why did you slant the test tube downward when you heated the copper sulfate?
4. If table salt were purchased by the pound, would you prefer to purchase salt that is a big clump or is a fine powder? Why?
5. Washing soda,  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ , is used in many places to launder clothes. What weight percent of washing soda is water? Show your work!
6. A 5.000 g sample of an unknown hydrate was heated for a while and then cooled to RT. The remaining sample weighed 3.825 g. Show your work to answer these questions.
  - How many moles of water were driven off?
  - How many moles of  $\text{MgSO}_4$  were in the anhydrous sample?
  - What is the ratio of moles of water to moles of  $\text{MgSO}_4$ ?
  - What is the molecular formula of the hydrate?
7. The hydrated form of copper sulfate is  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ . Show your work to compute how many grams of water these amounts of the anhydrous salt would absorb.
  - 0.500 mol of anhydrous  $\text{CuSO}_4$  would absorb \_\_\_\_\_ g of  $\text{H}_2\text{O}$
  - 50.0 g of anhydrous  $\text{CuSO}_4$  would absorb \_\_\_\_\_ g of  $\text{H}_2\text{O}$