

NAME _____

SECTION _____

DATE _____

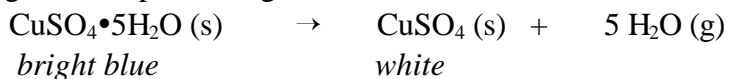
PERFORMANCE TASK #2

You will work on the following activities alone without consulting classmates or the instructor. You must hand in all these sheets, any data sheets, and the graph before you leave today. This activity has a point value of 50.

Part I: Hydrates

Hydrates are crystalline compounds in which one or more molecules of water are combined with each formula unit of a salt. The water is not bound tightly and can usually be driven off by subjecting the crystals to the hottest flame of a Bunsen burner for 5 to 10 minutes. If the hydrate is colored, a color change usually results upon heating as the anhydrous salt forms.

For example the following change occurs upon heating:



A generalized form of this reaction is:



Recall that the percentage of a component in a compound is calculated by:

$$(\text{Part/Whole}) \times 100 = \%$$

Preliminary Questions**(5 pt)**

Describe how you could find the % by mass of water in the hydrate $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ assuming that you did not already know the formula. Be specific and list the laboratory procedural steps you would take in the order that you would perform them.

Once you know the amount of water in grams in a particular sample of a hydrate, how can you find how many moles of water were in the hydrate?

How can you find out how many moles of the anhydrous salt (CuSO_4 in this example) were produced?

How can find the relative number of moles of salt and water in the hydrate?

How will you know the coefficient to place in front of the H_2O in the formula for the hydrate?

%%%

You will now perform the required laboratory activity to answer the following question:

What is the complete formula (Salt · x H_2O) for the hydrate you will be given in lab?
(25 pt)

You will be told the formula for the salt portion of the hydrate by your instructor. You will need to determine the correct formula for the hydrate through collection and analysis of laboratory data.

Construct a **data table** making sure to label everything. You may use the space on the next page or a separate piece of paper (be sure to put your name on it and staple it to this activity). Remember that for this activity, data is information (qualitative and quantitative) that is collected in the lab and is not modified by any calculation.

Construct a separate **results table**. Results include information that is obtained by manipulating the data in some manner. Show all calculations.

State a conclusion. Make sure you answer the main question above.

Some Procedural Suggestions:

Heat your crucible empty for 5 minutes and let it cool to drive off anything that may be lodged in the porcelain. Make sure the crucible is reasonably cooled off before you do any massing. Be careful and use the crucible tongs when handling the crucible. Do not touch the crucible with your hands once you have cleaned and heated it.

Use between 2 to 3 grams of the hydrate to start. Find masses to the most significant figures possible on the balances in the laboratory. If you have time, do the procedure more than once to check your results. Only do a second trial if you have completed both Parts I and II of this performance task.

While things are heating and cooling, work on Part II of this task.

Part II: Graphing**(20 pt)**

You will be given a data set like the one below in the laboratory on the day of the performance task. You will be required to graph the data by hand using the proper format and answer the questions below using a graphing calculator. Use this set of data for practice.

1. Use a piece of graph paper and plot the following data by hand. Be sure it is in the correct and complete format.

Diameter of Pt wire in inches (D)	Mass in grams of wire per foot (M)
0.0321	3.52
0.0375	4.80
0.0440	6.60
0.0501	8.56
0.0525	9.50
0.0660	15.0
0.0750	19.3
0.0831	23.7
0.1025	36.0

2. Would you describe the resulting plot as showing a: (circle one below)
a) linear relationship between the variables b) power relationship between the variables.
3. Using the graphing calculator, do the appropriate regression and determine the regression equation for the variables.

Write the equation for the relationship between diameter of a Pt wire in inches and the mass of the wire in grams per foot of wire **in terms of the variables**.
