6C – PERCENT COMPOSITION OF A HYDRATE

Analysis

Initial color of the crystal: _____

Final color of the crystal: _____

Table 1 – Crystal data

Trial #	Mass of crucible and cover (g)	Mass of crystals before heating (g)	Mass of crucible, cover and crystals before heating (g)	Mass of crucible, cover and crystals after heating (g)	Mass of crystals after heating (g)	Change in crystal mass before and after heating (g)
1						
2						
3						
					Total change in mass:	

Table 2 – Class data

Group	Mass of crystals before heating for Trial #1 (g)	Mass of crystals after heating for final trial (g)	Total change in crystal mass before and after heating (g)
1			
2			
3			
Average:			

Questions

1. A hydrate is a compound with water trapped in its crystal structure. What happened to the hydrate as it transitioned to an anhydrous crystal compound? Support your answer with evidence.

2. Describe the color change between the hydrated and anhydrous crystals.

3. Review data from other groups. What do you notice about the amount of water lost for hydrates with the most mass?

4. In what way does your answer to the previous question support the law of conservation of mass?

5. Use your data from Table 1 to calculate the percent of water present in your hydrate sample. Explain how you set up your calculation.

6. Use average class data from Table 2 to calculate an average percent of water present in the hydrate.

7. The accepted amount of water lost for 1 mole of the sample is 90.00 g/mol. The formula mass of the entire hydrate is 249.72 g/mol. What percent of water would have been lost if all of the water left the hydrate?

8. If 90.00 grams of water are lost per mole of hydrate, how many moles of water molecules are present per mole of hydrate? Show your work, round your answer to the nearest whole number, then insert this number as the coefficient for water in the hydrate formula, $CuSO_4 \cdot ?H_2O$.

9. Use your answers to questions 5 and 7 to find your percent error. The formula for percent error is:

$$\text{Percent Error} = \left| \frac{\text{accepted value - experimental value}}{\text{accepted value}} \right| \times 100$$

10. Use your answers to questions 6 and 7 to find average percent error for the class data. Which data produced the least error: class data, or your data?

11. Identify at least two possible sources of error. How did each of these sources create error?

12. The law of definite proportions states that regardless of the amount, the compound always contains the same elements in the same proportions by mass. Explain how the data that your class collected supports the law of definite proportions.