Names: _____

Lab Exercise: Percent Water in a Hydrate

Introduction: A **hydrate** is a crystalline solid that traps water as part of its crystal structure. Each type of hydrate traps water in its own unique way, but heating a hydrate will release the water and leave the **dehydrated** material behind. The solid remains unchanged except for the loss of the water. In this exercise, you will weigh a sample of a hydrate, heat it to remove the water, and weigh the dehydrated product that is left behind. Since you know the starting amount, and the final amount, you can calculate how much water was driven off. Then you will use your data to calculate the percent water in the hydrate.

Safety and waste disposal Information: Wear goggles when handling chemicals or glassware. Be sure to let hot glassware cool before handling it. Dispose of your dehydrated solid in the waste container provided. Wash your hands before leaving lab.

Procedure:

Wear goggles when handling glassware or chemicals!

Mass of the hydrate: Put a clean dry 30-mL beaker on the balance and re-zero by hitting the O/T button so that it reads 0.0000. After all we don't care about the mass of the beaker. Remove the beaker from the balance, and sprinkle enough hydrate in the beaker to cover the bottom. Put the beaker on the balance and record the mass of the hydrate by recording **all** the numbers on the balance readout and the **proper unit**.

Heating the hydrate: Turn the "heat" dial on the hotplate to "9" and allow the hotplate to warm up for a couple of minutes. Set the beaker containing the hydrate on the center of the hotplate and observe carefully as the hydrate heats up. When all of the bright color of the hydrate has disappeared, use crucible tongs to transfer the beaker to the desktop. Let the beaker cool for at least 5 minutes.

Observations as the hydrate was heated (color, noise if any, and appearance)

Determining the mass of the dehydrated solid left behind. Put a second clean dry 30-mL beaker on the balance and re-zero by hitting the O/T button so that it reads 0.0000. Remove the second beaker from the balance, and transfer the dehydrated solid from the first beaker into the second beaker. Put the second beaker on the balance and record the mass of the dehydrated solid by recording **all** the numbers on the balance readout and the **proper unit**.

Calculating the percent water in the hydrate. Calculate the mass of the water driven off as you heated the hydrate. Think about how to do this. What weights do you have? What can you subtract to equal the weight of the water that was heated off? To calculate the percent water in the original hydrate, divide the mass of the water driven off by the mass of the hydrate and multiply that answer by 100 to convert it to a percent. Round off your answer to the nearest tenth of a percent.

Data Table:

Mass of hydrate	
Color of hydrate	
Color of dehydrated solid	
Mass of dehydrated solid	
Mass of water driven off	
% water	

Show your calculation for mass of water here: _____

Show your calculation for % water here: _____ x 100 =

Questions

1. What evidence did you see that water was given off when the hydrate was heated?

2. If you used a larger sample and made no experimental errors, should your answer for the percent water be about the same, larger or smaller? _____

3. Check with your classmates to see if the percent water changed for different sample sizes. Keep in mind that various experimental errors sometimes influence the results. From comparing your results to your classmates, SHOULD the %water change much for different classmates? Yes or no, then explain.

4. If you weighed a beaker and it was 78.3525 grams, then you added some potassium chloride solid to it and the beaker plus solid weighed 84.9381 grams, what is the weight of the potassium chloride solid?

5. Should the mass of the dehydrated solid always be less than the hydrate? Yes or No.

6. If Larry's hydrate weighed 2.5583 grams, and his dehydrated solid weighed 1.8442 grams, what was his % water? Show your work.