Revised August 2012

HONORS LAB 4b: Finding the formula of a hydrated salt

Aim To determine the formula of a hydrated salt

Apparatus Test tubes, test tube holders, Bunsen burner, spatula, goggles, electronic balance

Chemicals Hydrated copper(II) sulfate

Method

1. Weigh an empty test tube on the electronic balance. Record the mass.

2. Add approximately 0.30 g of the hydrated copper(II) sulfate to the test tube and record the total mass. (*The mass need not be EXACTLY 0.30 g, but should be close to, and measured accurately*).

3. To avoid splattering, *gently* heat the test tube and its contents using the blue Bunsen flame (by wafting the test tube back and forth in the flame) for approximately 1-2 minutes. You will notice some color changes but **avoid heating so strongly that the salt starts to char and turn brown or black**. Record all of your observations.

4. **Allow the test tube to cool for about five minutes**. Record the mass using the electronic balance. **DO NOT PLACE HOT TEST TUBES ON THE ELECTRONIC BALANCES.**

5. While the first test tube is cooling, repeat steps #1-#3 with a second test tube, so that you are working on two separate experiments – heating one while you are waiting for the other to cool. This makes your work efficient, and allows you to complete two trials.

6. Repeat steps #3 and #4 with both test tubes as necessary, until a constant mass is obtained. (A constant mass is a mass that after repeated, heating, cooling and re-weighing cycles, stays the same).

Results

Observations

	1st trial	2nd trial
Mass of empty test tube		
Mass of test tube + hydrated salt BEFORE heating		
Mass of test tube + salt after 1st heating & cooling cycle		
Mass of test tube + salt after 2nd heating & cooling cycle		
Mass of test tube + salt after 3rd heating & cooling cycle		
Mass of test tube + salt after 4th heating & cooling cycle		
Mass of test tube + salt after 5th heating & cooling cycle		
Mass of test tube + salt after 6th heating & cooling cycle		
etc.		

Conclusion/Calculation

1. Perform the calculations below.

1st trail	2nd trial
(i) Calculate the mass of hydrated salt added to the test tube at the start of the experiment.	
(ii) Calculate the mass of the anhydrous (without water) salt at the end of the experiment.	
(iii) Calculate the mass of water driven off by heating the hydrated salt.	
(iv) Calculate the moles of the anhydrous (without water) salt present.	
(v) Calculate the moles of water driven off by heating.	
(vi) Compare your answers to (iv) and (v) above in order to determine the formula of the hydrated salt.	

2. In another similar experiment, a student heats the hydrated salt carelessly and some of the salt spits out of the test tube. What would be the effect of this experimental error on the calculation of the formula of the hydrated salt?