

Name: _____ Lab Partner(s): _____

Percent Composition Lab

Purpose: To measure the percent water in crystalline compounds called hydrates.

Materials: digital balance, beaker, ethanol burner, two test tubes, test tube clamp, plastic spoons, weigh paper, ring stand base, wash cloth, copper(II) sulfate pentahydrate ($\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$), magnesium sulfate heptahydrate ($\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$)

Procedure:

- (1) Label each test tube with the name of a salt. Use a beaker to support each test tube on the digital balance. Record the mass of each empty test tube.
- (2) Using a plastic spoon and weigh paper, transfer 2-3 g of a salt to the appropriately labeled test tube. Record the total mass of the test tube and salt.
- (3) Light the ethanol burner.
- (4) Using the test tube clamp, hold one of the test tubes at a 45° angle and gently pass it in and out of the flame. Be careful not to heat one spot excessively and not to aim the opening of the test tube toward anyone. Do not touch hot glass with your hands. Note any change in the appearance of the salt. As moisture begins to condense on the upper part of the test tube, gently heat the entire length of the tube. Continue heating until all the moisture is driven from the tube.
- (5) Repeat steps 2-4 for the other salt.
- (6) Weigh and record the mass of each test tube with its salt.
- (7) If time allows, reheat test tubes and weigh them to see if additional water has been driven off.

Results:

Salt	Mass of Test Tube (g)	Mass of Test Tube + Salt Before Heating (g)	Mass of Test Tube + Salt After Heating (g)	Mass of Test Tube + Salt After More Heating (g)	Other Observations

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Analysis:

- (1) Calculate the difference between the mass of each salt before and after heating. This difference represents the water removed from the hydrate.
- (2) Calculate the percent by mass of water lost from each compound.
- (3) Based on the chemical formula, calculate the percent mass of water in each of the compounds.
- (4) Calculate the percent discrepancy.

Salt	Initial Mass of Salt (g)	Final Mass of Salt (g)	Mass of Water Removed (g)	Experimental % Water	Theoretical % Water	% Discrepancy