

Name: _____

Block: _____

Due Date: _____










Stoichiometry Lab: Can You Make 2.00 Grams of a Compound?

OBJECTIVE: Use your skills of predicting chemical reactions, balancing equations, and calculating molar mass to solve a complex stoichiometry problem. Then test your laboratory techniques by mixing the reactants and isolating exactly 2.00 g of a compound (precipitate).

MATERIALS: (General - May have to revise during actual lab)

50 mL beaker	distilled water	wash bottle
100 mL beaker	glass stirring rod	filter paper
250 mL filtration flask	Buchner funnel	balance
50 mL graduated cylinder	evaporating dish/watch glass	scoopula
ring stand w/ clamps	amount (g) reactants (x2)	rubber hose

EXPECTATIONS: Use the following guidelines to prepare a **TYPED** formal lab report illustrating the calculations and procedures necessary to collect a known amount of substance in a chemical reaction:

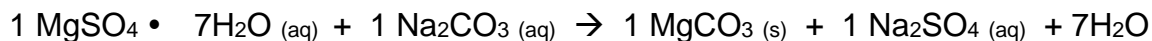
-  (1 pt) State the objective
-  (2 pts) List **ALL** materials used in lab including size (volume) of glassware
-  (4 pts) Write a step-by-step procedure that includes the actual amounts (volumes/masses) of materials (water/chemicals) used
-  (1 pt) Write the reaction number assigned to your group's reactants
-  (2 pts) Write the balanced equation including phases (states of matter) of reactants **AND** products
-  (4 pts) Show work for **ALL** calculations
 - Mass-mass stoichiometry calculations of **both** reactants (x2)
 - Mass of dried product (precipitate) recovered accounting for mass of original filter paper
 - Calculation of percent yield
 - Calculation of percent error
-  (2 pts) Re-create the data table provided and include the following:
 - calculated theoretical mass of each reactant and precipitate
 - masses of each reactant used – what you actually massed on the scale (*should be the same as the theoretical mass*)
 - actual mass of product recovered/collected
 - percent yield of the product (precipitate)
-  (4 pts) Percent error (accuracy) for the experiment
-  (4 pts) Conclusion/Analysis: This part should be very **THOROUGH**. Re-state objective and summarize in **FULL DETAIL** the lab results. Summarize percent error based off of mass of precipitate recovered and determine any sources of error. Account for what measures could have been taken to produce a higher percent yield of product

PRE-LAB REQUIREMENTS:

- a) Write a **balanced** chemical equation for your assigned reaction including phases (states of matter) of reactants **AND** products
- b) Use the solubility rules (reference table) to predict the state of matter of each reactant and which product will form a precipitate (s)
- c) Use mass-mass stoichiometry calculation to determine the mass of **EACH** reactant necessary to form 2.00 grams of your precipitate. * **If reactant is a hydrate, the molar mass MUST include the number of water molecules present** *
- d) Write a step-by-step procedure of the lab. For now, this will only be a **GENERAL** set of procedures. Your final, comprehensive procedures will later be revised after the lab to account for what you **ACTUALLY** did **DURING** the lab. Use the provided video and possible procedures as a guideline.

PROCEDURES: (GENERAL – May have to revise/modify during actual lab)

- 1) Mass out and record the mass of the filter paper.
- 2) Write group members' initials on the filter paper with a pencil.
- 3) Thoroughly clean and dry out all glassware before beginning filtration.
- 4) Place pre-massed filter paper inside Buchner funnel. Wet it down with DISTILLED water to keep it stuck to funnel. (*Make sure filter paper sits FLAT in funnel as to prevent pockets/folds*).
- 5) Assemble the ring stand and clamp system.
- 6) Assemble rubber hose by connecting it to the side of the metal sink spicket and to the side of the _____mL filtration flask.
- 7) Place the Buchner funnel (with filter paper inside) above the _____mL filtration flask and clamp down the neck of the _____mL filtration flask with the ring clamp.
- 8) Mass out the calculated theoretical mass of _____ g of (*insert formula of reactant A*) onto a weigh boat/evaporating dish.
- 9) Mass out the calculated theoretical mass of _____ g of (*insert formula of reactant B*) onto a weigh boat/evaporating dish.
- 10) Transfer (*insert grams of formula of reactant A*) contents into a _____mL beaker and transfer (*insert grams of formula of reactant B*) contents into a _____mL beaker.
- 11) Fully dissolve each reactant with 20mL of DISTILLED water. (*Use more water if necessary to fully dissolve the reactants. Keep track of volume of extra distilled water used*).
- 12) Combine each dissolved solution into _____mL beaker and stir for 5 minutes with stirring rod until the product (precipitate) is formed. (*Some reactions may take longer than others. Likewise, some reactions may produce a thicker volume of precipitate than others*).
- 13) Turn on the sink faucet to allow the suction filtration process to begin.
- 14) After the two compounds have been fully combined, isolate the precipitate by filtering the solution. Pour the solution very carefully and slowly down a stirring rod into the CENTER of the Buchner funnel. (*Be careful to not let the solution flow over the funnel. The slower the better*).
- 15) Wash out the _____mL beaker several times with distilled water from the wash bottle provided. Pour each washing into the Buchner funnel to reclaim any precipitate that may have stuck to the sides of the beaker. (*This is where most of percent error will occur*).
- 16) After all of the filtrate (your aqueous compound) has run through the Buchner funnel, gently rinse the precipitate with distilled water to force all of the filtrate to rinse through.
- 17) When the suction filtration process is complete, use the flat edge of a metal spatula to carefully and gently remove the filter paper from the Buchner funnel by getting underneath the filter paper.
- 18) Carefully place the filter paper and precipitate onto a watch glass/paper towel and set in a designated location to allow to air-dry overnight.
- 19) THOROUGHLY clean all glassware by rinsing out with sink water and drying with paper towel.
- 20) After the precipitate has fully dried overnight, mass out precipitate on scale.

BALANCED CHEMICAL EQUATION AND STOICHIOMETRY CALCULATIONS:

$$\frac{2.00 \text{ g MgCO}_3}{1} \mid \frac{1 \text{ mol MgCO}_3}{84.32 \text{ g MgCO}_3} \quad \dots$$

DATA TABLE:

Reactant/ Product	Theoretical Mass	Actual Mass	% Yield
A	3.12 g	3.12 g	-----
B	4.56 g	4.56 g	-----
C	-----	-----	-----
D	2.00 g		

include actual formulas of reactants/products in the first column