"1.00 g of a Compound" Lab Briefing

- A ***double replacement*** reaction of **two *(aq)*** solutions will often produce a **precipitate (*s*)**
  - **A:** The ***solid*** precipitate can then be easily isolated through a ***filtration process.***
  - **B:** Some ionic compounds contain ***water molecules*** **(hydrates)** that are trapped within their crystal structure and therefore must be ***dried out.***
- **LAB OBJECTIVE:** To produce **EXACTLY** ***1.00 grams*** of desired product ***(precipitate)*** using solubility rules of a double replacement reaction:
  - **Pre-Lab Step 1:** Write a ***balanced chemical equation*** for your given reaction.
  - **Pre-Lab Step 2:** Assign states of matter ***(aq or s)*** to ***ALL*** reactants and products in the chemical equation using ***solubility rules.***
  - **Pre-Lab Step 3:** Calculate the ***THEORETICAL MASS (g)*** of ***BOTH REACTANTS*** needed to exactly produce the desired 1.00 grams of the ***solid precipitate***.
    - **A:** 1.00 g of solid precipitate is the ***GIVEN*** → Use ***MASS → MASS*** stoichiometry to determine required ***mass*** of ***BOTH REACTANTS.*** Therefore, **two (2) mass → mass** stoichiometry calculation set-up required.
    - **B:** If ***ANY*** reactant is a ***HYDRATE***, you ***MUST*** take the ***hydrate mass*** into account when determining its **total** ***MOLAR MASS.***
    - **C:** Number of **water molecules MUST** also be written on the product side to correctly balance the equation.
    - Ex: $MgSO_4 \bullet 7H_2O_{(aq)} + Na_2CO_{3\,(aq)} \rightarrow MgCO_{3\,(s)} + Na_2SO_{4\,(aq)}$
      - **1** $MgSO_4 \bullet$ ***7H₂O*** $_{(aq)}$ + **1** $Na_2CO_{3\,(aq)} \rightarrow$ **1** $MgCO_{3\,(s)}$ + **1** $Na_2SO_{4\,(aq)}$ + ***7H₂O***
    - $MgSO_4 \bullet 7H_2O \rightarrow$ 120.37 g/mol ***$MgSO_4$*** + 126.112 g/mol ***$7H_2O$*** = **246.4822 g/mol**
  - **Pre-Lab Step 4:** Watch the provided **VIDEO** for performing the proper filtration method/process.

- **Actual Lab Step 1:** Once the ***THEORETICAL MASS*** of both reactants are ***CALCULATED***, dissolve both reactants in ***SEPARATE*** beakers using ***25mL*** of ***DISTILLED*** water.

- **Actual Lab Step 2:** The two (2) ***DISSOLVED*** reactant solutions are then ***MIXED*** together in ***ONE of the two*** beakers (or into a third beaker) to produce the **solid precipitate**.

- **Actual Lab Step 3:** ***RECOVER*** precipitate through ***FILTRATION*** method using a piece of ***PRE-MASSED filter paper***.

- **Actual Lab Step 4:** ***CAREFULLY*** remove ***ALL*** precipitate **AND** filter paper from funnel and place on **DRY** towel.

- **Actual Lab Step 5: MASS** dry precipitate **AND** filter paper together. ***SUBTRACT*** the total mass (precipitate + filter paper) from the original mass of filter paper to get just the mass of the precipitate.

- **AFTER Lab Step 1:** Calculate ***% YIELD*** to determine how much of precipitate was ***ACTUALLY*** **produced or recovered**.

  - **How close is *your ACTUAL* mass to the 1.00 g *THEORETICAL* mass of precipitate?**

  - **% Yield** = $\dfrac{\text{Actual Yield of Precipitate}}{\text{Theoretical Yield of Precipitate}} \times 100$

- **AFTER Lab Step 2:** Calculate ***% ERROR*** to determine how much of precipitate was **NOT produced or recovered**.

  - **% Error** = $\dfrac{[\text{Actual} - \text{Theoretical}]}{\text{Theoretical}} \times 100$