**Steps for Reaction Stoichiometry**

Must include **chemical formula** in **every step**

**Step 1:** Write the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ from the problem

**Step 2:**  What are you \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_

**Step 3:** What you need:

1. **Start unit** 🡺 \_\_\_\_\_\_\_\_\_\_\_\_\_\_ : *conversion needed*
2. **Mole Ratio** : *from the* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in a \_\_\_\_\_\_\_\_\_\_\_\_chemical *reaction*
3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 🡺 **desired unit**: *conversion needed*

***Conversions:***

* **1 mole = 22.4 Liters** (@ Standard Temperature & Pressure)
* **1 mole = # grams** ( Molar Mass)
* **1 mole = 6.02 x 1023 particles** (atom, molecule, or formula unit)

**Step 4:** Set- Up

\_\_\_\_\_\_ desired **\_\_\_\_\_\_\_** with **end** substance

 **formula**

**\_\_\_\_** with **\_\_\_\_\_\_** & **start** substance **formula** *from problem*

\_\_\_\_\_\_ start \_\_\_\_\_\_\_ with **start** substance **formula**

\_\_\_\_\_\_ **mole** with **start** substance **formula**

\_\_\_\_\_\_ **mole** with **start** substance **formula**

\_\_\_\_\_\_ **mole** with **end** substance **formula**

\_\_\_\_\_\_ **mole** with **end** substance **formula**

**Ex. 1** How many grams of ammonia are produced when 3.6 x 1023 particles of nitrogen react with hydrogen?

 N2 +3 H2 🡺 2NH3

**Ex. 2** How many **moles of sodium** will react with water to produce **4.0 mole** of **hydrogen** in the following reaction?
 2Na(*s*) + 2H2O(*l*) → 2NaOH(*aq*) + H2(*g)*

**Ex. 3** When sulfur dioxide reacts with oxygen at STP, how many particles of oxygen are needed to produce 19.8L of sulfur trioxide? 2SO2 + O2 🡺 2SO3

**Ex. 4** The following reaction shows the synthesis of zinc citrate, an ingredient in toothpaste, from zinc carbonate and citric acid. How many **liters of CO2** are produced from **23.0grams** of citric acid(HC6H7O7)?

3ZnCO3(*s*) + 2HC6H7O7(*aq*) → Zn3(C6H5O7)2(*aq*) + 3H2O(*l*) + 3CO2(*g*)

**Ex5** Calculate the **formula units of silver bromide** produced from **22.5 g of silver nitrate** in the following reaction:

2AgNO3(*aq*) + MgBr2(*aq*)→ 2AgBr(*s*) + Mg(NO3)2(*aq*)