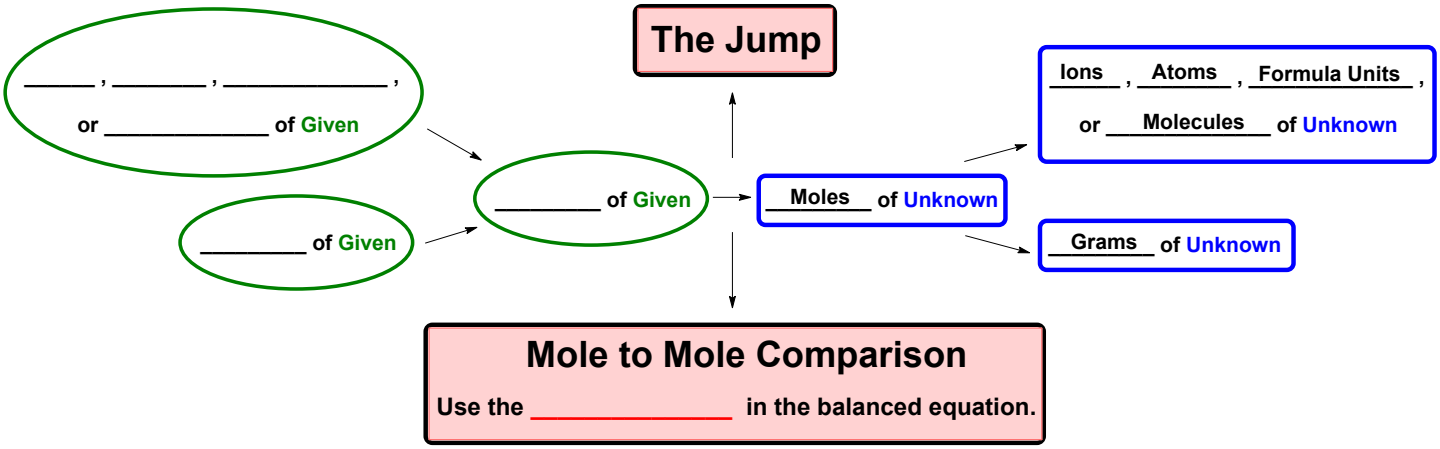
CONCEPT: STOICHIOMETRY

- **Stoichiometry** deals with the numerical relationship between compounds in a *balanced chemical equation*.
  - □ It allows us to determine the amount of products from reactants and vice versa.

$$\underset{12.3\ g}{\mathbf{2}\ H_2\ (g)} + \mathbf{1}\ O_2\ (g) \longrightarrow \underset{\text{? grams}}{\mathbf{2}\ H_2O\ (g)}$$

Stoichiometric Chart

- The chart uses the **Given** quantity of a compound to determine the **Unknown** quantity of another compound.



EXAMPLE: How many grams of NO are produced when 15.0 g N_2 reacts?

$$\mathbf{1}\ N_2\ (g) + \mathbf{1}\ O_2\ (g) \longrightarrow \mathbf{2}\ NO\ (g)$$

STEP 1: Map out the portion of the stoichiometric chart you will use.

STEP 2: Convert the **Given** quantity into moles of **Given**.

- □ If a compound is said to be in excess, then just _____ it.

STEP 3: Do a **Mole to Mole comparison** to convert moles of **Given** into moles of **Unknown**.

STEP 4: If necessary, convert the moles of **Unknown** into the final desired units.

CONCEPT: STOICHIOMETRY

PRACTICE: The combination reaction for the formation of hydrazine is shown below:

$$4\ NH_3\ (g) \quad + \quad N_2\ (g) \longrightarrow 3\ N_2H_4\ (l)$$

Determine the number of moles of hydrazine formed when 25.7 g ammonia reacts with excess nitrogen gas.

a) 1.13 mol b) 0.567 mol c) 0.881 mol d) 2.81 mol

PRACTICE: The reaction between solid phosphorous and fluorine is given below:

$$P_4\ (s) \quad + \quad 12\ F_2\ (g) \longrightarrow 4\ PF_6\ (aq)$$

If 6.92×10^{-5} molecules of solid phosphorous react to completion, how many grams of phosphorous hexafluoride would be produced?

a) 5.03×10^{-26} g b) 7.14×10^{-26} g c) 8.19×10^{-26} g d) 6.65×10^{-26} g

PRACTICE: Determine the density of 50.0 mL iron (II) bromide when the following chemical reaction produced 112.7 g iron (II) phosphate.

$$2\ K_3PO_4\ (aq) \quad + \quad 3\ FeBr_2\ (aq) \longrightarrow Fe_3(PO_4)_2\ (s) \quad + \quad 6\ KBr\ (aq)$$

a) 2.31 g/mL b) 6.51 g/mL c) 4.08 g/mL d) 3.95 g/mL