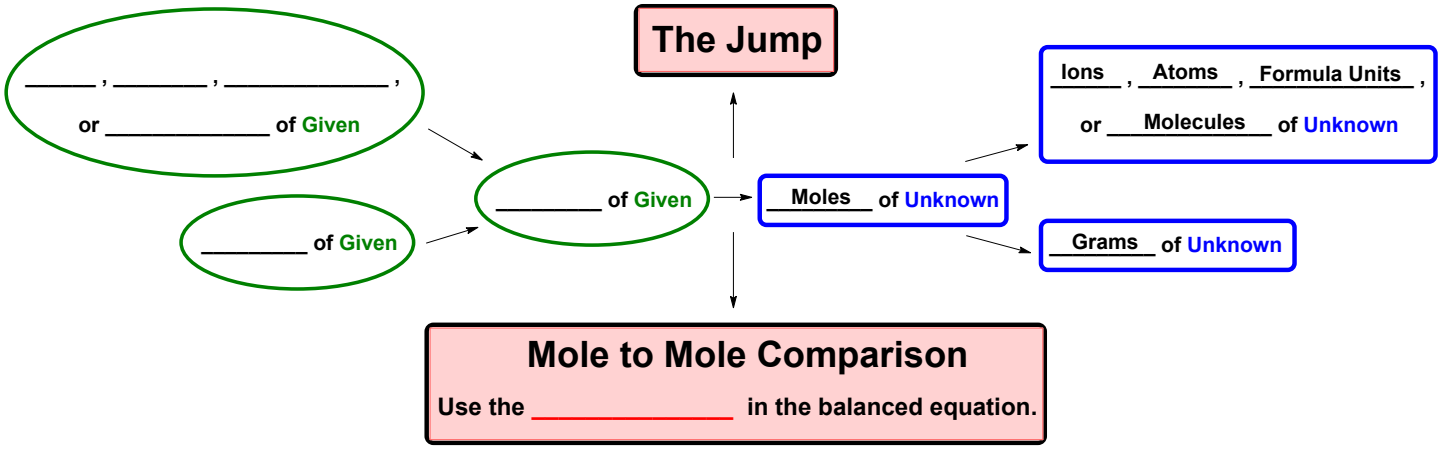
CONCEPT: STOICHIOMETRY

- **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.

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

Stoichiometric Chart

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



EXAMPLE: How many grams of H_2O are produced when 12.3 g H_2 reacts?

$$\mathbf{2}\ H_2\ (g) + \mathbf{1}\ O_2\ (g) \longrightarrow \mathbf{2}\ H_2O\ (g)$$

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 oxidation of chromium solid is represented by the following equation:

$$4\ Cr\ (s) + 3\ O_2\ (g) \longrightarrow 2\ Cr_2O_3\ (s)$$

How many moles of chromium (III) oxide are produced when 34.69 g Cr reacts with excess oxygen gas?

PRACTICE: The reaction of potassium chlorate and sucrose is given below:

$$8\ KClO_3 + C_{12}H_{22}O_{11} \longrightarrow 8\ KCl + 12\ CO_2 + 11\ H_2O$$

If 2.33×10^{-7} formula units of potassium chlorate are reacted, how many grams of carbon dioxide will be produced?

PRACTICE: If the density of ethanol, CH_3CH_2OH, is 0.789 g/mL, how many milliliters of ethanol are needed to produce 4.8 g of H_2O in the following reaction?

$$CH_3CH_2OH\ (l) + 3\ O_2\ (g) \longrightarrow 3\ H_2O\ (l) + 2\ CO_2\ (g)$$