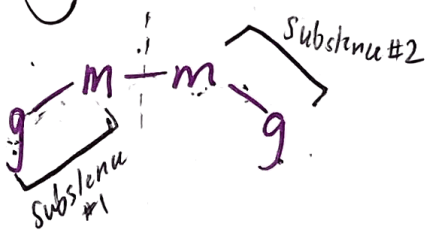
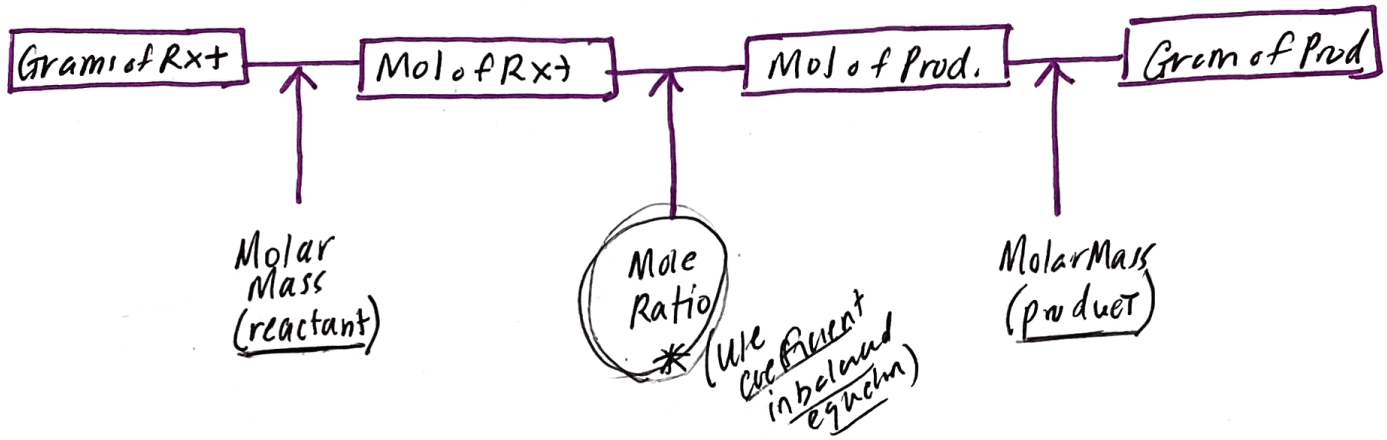
STOICHIOMETRY - to measure an element



- process of determining relationship between grams of reactant & grams of product in a chemical rxn.
- based on law of conservation of mass



* **Mole Ratio**: Ratio of # of moles between any 2 substances in a balanced equation

* Coefficients = # of moles

Ex: $2K + Br_2 \rightarrow 2KBr$

possible ratios? # of mole ratios $= (n)(n-1) = 3(3-1) = 6$

$\frac{2\text{ mol K}}{2\text{ mol KBr}}$ $\frac{2\text{ mol K}}{1\text{ mol Br}_2}$ $\frac{1\text{ mol Br}_2}{2\text{ mol KBr}}$ $\frac{1\text{ mol Br}_2}{2\text{ mol K}}$ $\frac{2\text{ mol KBr}}{2\text{ mol K}}$ $\frac{2\text{ mol KBr}}{1\text{ mol Br}_2}$

Ex: Mole to Mole Calculation

g – m–m – g

$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$

Given: 10 mol C_3H_8 → How many moles of CO_2?

$$\frac{10\text{ mol } C_3H_8}{1\text{ mol } C_3H_8} \left| \frac{3\text{ mol } CO_2}{} \right. = 30\text{ moles } CO_2$$

* **Main Idea**: - the amount of reactant present at start of rxn determines how much product is formed.
- the balanced equation is your "recipe"

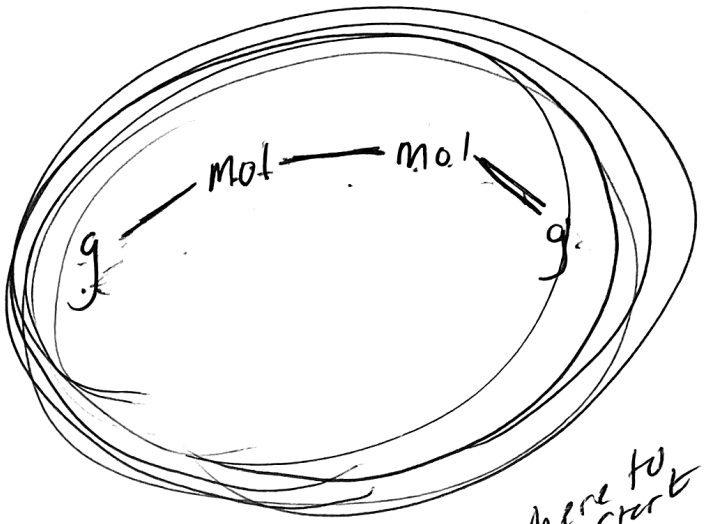
4 (ideal) Main stoichiometry problem types:

Mole to Mole

Mole to Grams

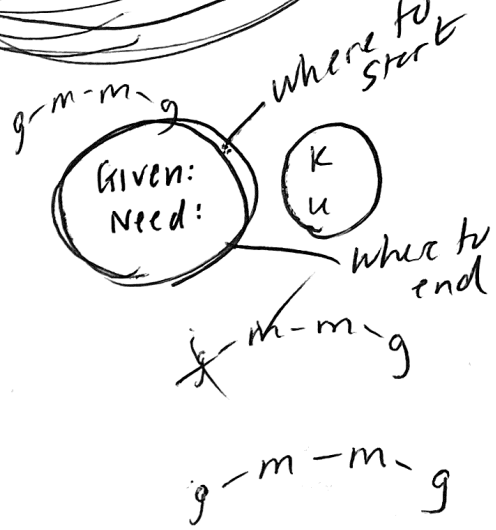
Grams to Moles

Grams to Grams



Solving Problems:

1. Balance Equation
2. Identify known & unknown
3. Follow "pathway"



Ex 1:

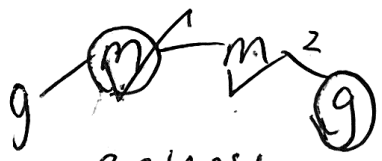
(1.25 mol) g ?

$$TiO_2 + C + 2Cl_2 \rightarrow TiCl_4 + CO_2$$

Start w/ 1.25 mol TiO_2 — What mass (g) of Cl_2?

Known: 1.25 mol TiO_2

Unknown: g Cl_2



2 steps:

① mole to mole

② mole to gram

①	②
1.25 mol TiO_2 | 2 mol Cl_2 / 1 mol TiO_2	70.9 g Cl_2 / 1 mol Cl_2

$$= 177 \text{ g } Cl_2$$

$$4\,FeO + O_2 \longrightarrow 2\,Fe_2O_3$$

40 g of O_2 in a tank — How many g of Fe_2O_3 can be made?

know: 40 g O_2

want: g Fe_2O_3

1 ~~2~~ ~~3~~ g

3 steps

$40\,g\,O_2$	$1\ mol\,O_2$	$2\ mol\,Fe_2O_3$	$160\ g\,Fe_2O_3$
	$32\,g\,O_2$	$1\ mol\,O_2$	$1\ mol\,Fe_2O_3$

$$= 400\ g\ Fe_2O_3$$