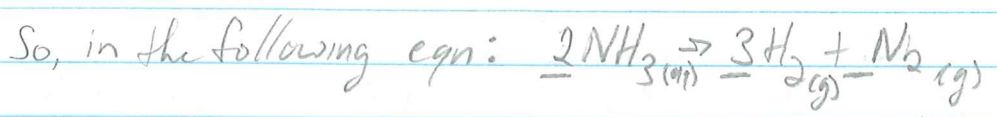


### 13.3 Gas Stoichiometry

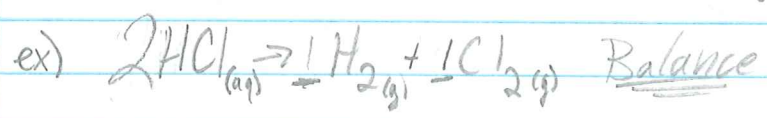
\* In reactions involving gases, the coefficients represent both moles, and volumes.



The coefficients tell us the ratio of  $\text{N}_2 : \text{H}_2 = \frac{1 \text{ mole N}_2}{3 \text{ mole H}_2}$

This also means volumes follow same ratio  $\frac{1 \text{ L N}_2}{3 \text{ L H}_2}$

\* To solve a stoich problem for gases you have to know the balanced equation & volume of 1 gas



If you have 2.3 L of H<sub>2</sub>, what is volume of Cl<sub>2</sub> produced?

$\frac{2.3 \text{ L H}_2}{1 \text{ L H}_2} \times \frac{1 \text{ L Cl}_2}{1 \text{ L H}_2} = \text{2.3 L Cl}_2 \text{ produced}$



7.1 L CO used - how much CO<sub>2</sub> is produced?

$\frac{7.1 \text{ L CO}}{2 \text{ L CO}} \times \frac{2 \text{ L CO}_2}{1 \text{ L O}_2} = \text{7.1 L CO}_2 \text{ produced}$

ex) 7.1 L CO used, how much O<sub>2</sub> required?

$\frac{7.1 \text{ L CO}}{2 \text{ L CO}} \times \frac{1 \text{ L O}_2}{2 \text{ L CO}} = \text{3.55 L O}_2$

2

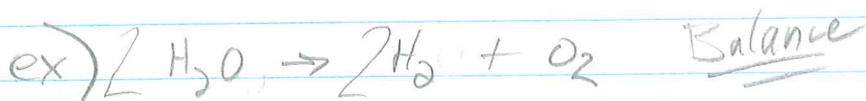
## Volume to Mass Stoich

\* You will start off with vol of 1 gas, and P & T.

1<sup>st</sup> - convert L of given to L of unknown

2<sup>nd</sup> - Plug volume into  $PV = nRT$  to solve for moles of unknown

3<sup>rd</sup> - Convert moles to mass of unknown (using  $\frac{\text{molar mass}}{\text{mass}}$ )



If you end up with 2 L of  $\text{H}_2$ , how many grams of  $\text{O}_2$  will you have?



1<sup>st</sup>  $\frac{2 \text{L H}_2}{2 \text{L H}_2} \times 1 \text{L O}_2 = 1 \text{L O}_2 \text{ produced}$

2<sup>nd</sup>  $PV = nRT$      $1 \text{ atm} \times 1 \text{ L} = n \times 0.0821 \times 298 \text{ K}$   
 $\text{O}_2 = 2 \times 0 = \underline{16.0 \times 2} \quad n = 0.04 \text{ mol O}_2$

3<sup>rd</sup>  $\frac{0.04 \text{ mol O}_2}{1 \text{ mol O}_2} \times 32.0 \text{ g} = \boxed{1.28 \text{ g O}_2}$