$2AlCl_3 + 3CaSO_4 \longrightarrow Al_2(SO_4)_3 + 3CaCl_2$

Al: ~~2~~ 2	Al: 2
Cl: ~~3~~ 6	Cl: ~~2~~ 6
Ca: ~~1~~ 3	Ca: ~~1~~ 3
SO_4: ~~1~~ 3	SO_4: 3

2 mol : 3 mol : 1 mol : 3 mol

Recap (100pts)

- Balance + mol ratio
- Mol ratio conversion ($mol_A \rightarrow mol_B$)
- 2 and 3 step mass stoichiometry
- 2 Ideal gas law
- 4-5 Filling In Blank

$2AlCl_3 + 3CaSO_4 \longrightarrow Al_2(SO_4)_3 + 3CaCl_2$

2 mol $AlCl_3$: 3 mol $CaSO_4$: 1 mol $Al_2(SO_4)_3$: 3 mol Cl_2

2.60 mol $AlCl_3$, convert to mol $CaCl_2$

$$2.60 \text{ mol } AlCl_3 \times \frac{3 \text{ mol } CaCl_2}{2 \text{ mol } AlCl_3} = 3.90 \text{ mol } CaCl_2$$

Mass Stoichiometry Chart (2) 1,2 and 1,2,3

Step 1	Step 2	Step 3
$mass_A \rightarrow mol_A$	$mol_A \rightarrow mol_B$	$mol_B \rightarrow mass_B$
start g A | 1 mol A / MM g A	step 1 mol A | * mol B / * mol A	step 2 mol B | MM g B / 1 mol B

* Molar Ratio

$2AlCl_3 + 3CaSO_4 \longrightarrow Al_2(SO_4)_3 + 3CaCl_2$

2 mol $AlCl_3$: 3 mol $CaSO_4$: 1 mol $Al_2(SO_4)_3$: 3 mol $CaCl_2$

260.0 g $AlCl_3$, convert to mass $CaCl_2$

(133.33 g/mol) (110.98 g/mol)

convert g $AlCl_3 \rightarrow$ mol $AlCl_3$	mol $AlCl_3 \rightarrow$ mol $CaCl_2$	mol $CaCl_2 \rightarrow$ mass $CaCl_2$
260.0 g $AlCl_3$ | 1 mol $AlCl_3$ / 133.33 g $AlCl_3$	1.95 mol $AlCl_3$ | 3 mol $CaCl_2$ / 2 mol $AlCl_3$	2.93 mol $CaCl_2$ | 110.98 g $CaCl_2$ / 1 mol $CaCl_2$
= 1.95 mol $AlCl_3$	= 2.93 mol $CaCl_2$	= 325.17 g $CaCl_2$

Fundimental [def. of P, V, T, and n]

Boyles: $P_1V_1 = P_2V_2$ (Indirect)

Charles: $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ (direct)

Gay-Lussacs $\frac{P_1}{T_1} = \frac{P_2}{T_2}$ (direct)

Avagadro $\frac{V_1}{n_1} = \frac{V_2}{n_2}$ (direct)

Combined gas law

$$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$$

Ideal gas law

[Adds "n", mol]

$PV = nRT$

R = Ideal (Universal) Const.

$Cl_2(g)$: $V = 2.10\,L$ $n = 1.10\,mol$ $T = 310.0\,k$

$R = 0.0821 \frac{L \cdot atm}{mol \cdot k}$ $P = \_\_\_ atm$

$$P = \frac{nRT}{V} = \frac{1.10\,mol \cdot 0.0821 \frac{L \cdot atm}{mol \cdot k} \cdot 310.0k}{2.10L}$$

$$= \underline{13.33\,atm}$$

$PV = nRT$

$P = \frac{nRT}{V}$

$V = \frac{nRT}{P}$

$T = \frac{PV}{nR}$

$n = \frac{PV}{RT}$