Noteset 6A (Part 3) - In Class Noteset

Single and Double Molar Conversions

Single Molar Conversions

given $aA + bB \rightarrow cC + dD$

convert ___ mol A to mol B

$$\frac{\text{___ mol A}}{\text{a mol A}} \left| \frac{\text{b mol B}}{\text{a mol A}} \right. = \text{___ mol B}$$

a, b, etc. : coefficient bal. eqn.

A, B, etc. element compound

Mol Ratio

a mol A = b mol B

Conversion Factor

$$\frac{\text{b mol B}}{\text{a mol A}} = 1$$

The mol ratio converts between mol A and mol B

Double Molar Conversions

Two single molar conversions used to convert between two different units/parts of a reaction.

given: $aA + bB \rightarrow cC + dD$

convert start g A to ___ mol B

Two Steps: mass A to mol A and mol A to mol B

Two Step Mass Conversion

mass A to mol B

① mass A to mol A
② mol A to mol B

mol A to mass B

① mol A to mol B
② mol B to mass B

Single Molar Conversion Example

$$2\,Na + 1\,Cl_2 \longrightarrow 2\,NaCl$$

3.0 mol Na, convert to mol Cl_2 and mol NaCl

3.0 mol Na → mol Cl_2

2 mol Na = 1 mol Cl_2

$$\frac{3.0\text{ mol Na} \mid 1\text{ mol } Cl_2}{2\text{ mol Na}}$$

$$\frac{3.0 \times 1}{2} = 1.5\text{ mol } Cl_2$$

3.0 mol Na → mol NaCl

2 mol Na = 2 mol NaCl

$$\frac{3.0\text{ mol Na} \mid 2\text{ mol NaCl}}{2\text{ mol Na}}$$

$$\frac{3.0 \times 2}{2} = 3.0\text{ mol NaCl}$$

Double Molar Conversion Example

$$2\,Na + Cl_2 \longrightarrow 2\,NaCl$$

22.99 g/mol 70.90 g/mol 58.44 g/mol

Convert 150.0 g Cl_2 to mol NaCl

A B

① mass Cl_2 to mol Cl_2

② mol Cl_2 to mol NaCl

① 150.0 g Cl_2 → mol Cl_2

$$\frac{150.0\text{ g } Cl_2 \mid 1\text{ mol } Cl_2}{70.90\text{ g } Cl_2}$$

$$= 2.12\text{ mol } Cl_2$$

② mol Cl_2 → mol NaCl

$$\frac{2.12\text{ mol } Cl_2 \mid 2\text{ mol NaCl}}{1\text{ mol } Cl_2}$$

$$= 4.24\text{ mol NaCl}$$