Chemistry Notes

g of A → (②) → gas (L) Volume A —(③)→ Moles A —(①)→ moles B → g of B → gas Volume B (L)

① D.A. using coefficients from balanced equation

Dimensional Analysis

$10 \text{ mol A} \times \left(\frac{X \text{ mol B}}{Y \text{ mol A}}\right)$

② D.A. using molar mass from periodic table;

1 mol = molar mass in g

$\left(\frac{1 \text{ mol}}{\text{molar mass}}\right)$ or $\left(\frac{\text{molar mass}}{1 \text{ mol}}\right)$

③ If at STP, D.A. using 1 mol A = 22.4 L A

If not at STP, use $PV = nRT$

* make sure you use correct units * (L, K, atm)

Example:

$10.0 \text{ g } N_2$ → $\text{mol } N_2$ → $\text{mol } H_2$ → Volume H_2 (L)

$N_2 + 3H_2 \rightarrow 2NH_3$

$10.0 \text{ g } N_2 \times \left(\frac{1 \text{ mol } N_2}{28.02 \text{ g } N_2}\right) = 0.357 \text{ mol } N_2$

$0.357 \text{ mol } N_2 \times \left(\frac{3 \text{ mol } H_2}{1 \text{ mol } N_2}\right) = 1.07 \text{ mol } H_2$

$25°C = 298 K$

$735 \text{ mmHg} \times \left(\frac{1 \text{ atm}}{760 \text{ mmHg}}\right) = 0.967 \text{ atm}$

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

$= \frac{(1.07 \text{ mol})\left(0.0821 \frac{\text{L·atm}}{\text{mol·K}}\right)(298 \text{ K})}{0.967 \text{ atm}}$

$= 27.1 \text{ L } H_2$