

Chemical Reactions Review

① $\text{Ca(OH)}_2 = 40.1 + 2(16) + 2(1.01) = 74.12\text{g}$

Ca: $\frac{40.1}{74.12} = 54.1\%$ O: $\frac{32}{74.12} = 43.2\%$ H: $\frac{2.02}{74.12} = 2.7\%$

② Ag: $\frac{63.5}{107.9} = 0.5885$ $\frac{.5885}{.5885} = 1$

N: $\frac{8.25}{14} = 0.5893$ $\frac{.5893}{.5885} = 1$ AgNO₃

O: $\frac{28.25}{16} = 1.7656$ $\frac{1.7656}{.5885} = 3$

③ S: $3.72\text{g} - 2.47\text{g} = 1.25\text{g}$

Cu: $\frac{2.47}{63.5} = 0.0389$ $\frac{0.0389}{0.0389} = 1$

S: $\frac{1.25}{32.1} = 0.0389$ $\frac{0.0389}{0.0389} = 1$ CuS

④ (a) $\frac{3.5}{2} \text{C}_3\text{H}_6 = \frac{x}{6} \text{CO}_2$ 10.5 mol

(b) $\text{C}_3\text{H}_6: \frac{50\text{g}}{42.06\text{g/mol}} = 1.19\text{ mol}$

$\frac{1.19}{2} \text{C}_3\text{H}_6 = \frac{x}{9} \text{O}_2$ $x = 5.36\text{ mol}$

1 mol O₂ = 32g
5.36 x

171.5g

$$4 \text{ (c) } C_3H_6: \frac{20g}{42.06g/mol} = 0.476 \text{ mol}$$

$$\frac{0.476}{2} C_3H_6 = \frac{x}{6} CO_2 \quad x = 1.428 \text{ mol}$$

at STP

$$1 \text{ mol} = 22.4 \text{ L}$$

$$1.428 = x \quad x = 31.99 \text{ L}$$

$$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$$

$$\frac{(1 \text{ atm})(31.99 \text{ L})}{(273 \text{ K})} = \frac{(1 \text{ atm})(V_2)}{(298 \text{ K})}$$

$$\underline{V = 34.9 \text{ L}}$$

$$4 \text{ (d) } C_3H_6: \frac{16g}{42.06g/mol} = 0.38 \text{ mol}$$

$$\frac{0.38}{2} C_2H_6 = \frac{x}{4120 \text{ J}} \quad x = \underline{782.8 \text{ J}}$$

$$5 \text{ (a) } \frac{2}{1} V_2O_5 = \frac{x}{5} Ca \quad x = 10 \text{ mol (we only have 6)}$$

∴ Calcium is the limiting reactant.

$$5 \text{ (b) } V_2O_5: \frac{120g}{181.8g/mol} = 0.66 \text{ mol} \quad Ca: \frac{60g}{40.1g/mol} = 1.5 \text{ mol}$$

$$\frac{0.66}{1} V_2O_5 = \frac{x}{5} Ca \quad x = 3.3 \text{ mol (we only have 1.5 mol)}$$

∴ Calcium is the limiting reactant

$$\textcircled{6} \quad \text{NH}_3: \frac{2.00 \text{ g}}{17.03 \text{ g/mol}} = 0.117 \text{ mol} \quad \text{F}_2: \frac{8.00 \text{ g}}{38 \text{ g/mol}} = 0.211 \text{ mol}$$

$$\frac{0.117}{2} \text{ NH}_3 = \frac{x}{5} \text{ F}_2 \quad x = 0.2925 \text{ mol (we only have 0.211 mol)}$$

\therefore F_2 is the limiting reactant, so we must use F_2

$$\frac{0.211}{5} \text{ F}_2 = \frac{x}{1} \text{ N}_2\text{F}_4 \quad x = 0.0422 \text{ mol}$$

$$\begin{array}{l} 1 \text{ mol N}_2\text{F}_4 = 104 \text{ g} \\ 0.0422 \quad \quad = x \end{array}$$

$$\underline{4.39 \text{ g}}$$