

Pop - QUIZ

1. a) What volume of O_2 and H_2 (at SATP) would you need to produce 500 ml of water?

(Hint: density of water 1kg/L)

$$500 \text{ mL} \rightarrow 500 \text{ g}$$

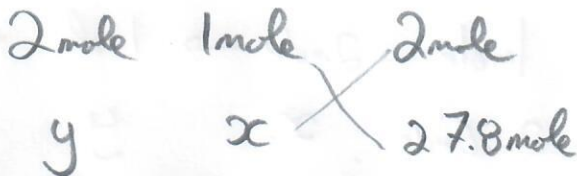
$$P = 101.3 \text{ kPa}$$

$$T = 25^\circ\text{C} \rightarrow 298 \text{ K}$$

$$\textcircled{1} n = \frac{m}{M}$$

$$n = \frac{500}{18}$$

$$n = 27.8 \text{ moles}$$



$$\boxed{x = 13.9 \text{ mole}}$$

$$\boxed{y = 27.8 \text{ mole}}$$

$$\textcircled{3} PV = nRT$$

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

$$V = \frac{13.9(8.31)(298)}{101.3}$$

$$\boxed{V = 339.8 \text{ L}}$$

$$\textcircled{4} PV = nRT$$

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

$$V = \frac{27.8(8.31)(298)}{101.3}$$

$$\boxed{V = 679.6 \text{ L}}$$

b) If the total pressure of the reactants is 600 kPa, what will be the partial pressure of O_2 ?

$$\textcircled{1} n_T = n_{O_2} + n_{H_2}$$

$$n_T = 13.9 + 27.8$$

$$\underline{n_T = 41.7 \text{ moles}}$$

$$\textcircled{2} P_{O_2} = \frac{n_{O_2} \cdot P_T}{n_T}$$

$$P_{O_2} = \frac{13.9 \cdot 600}{41.7}$$

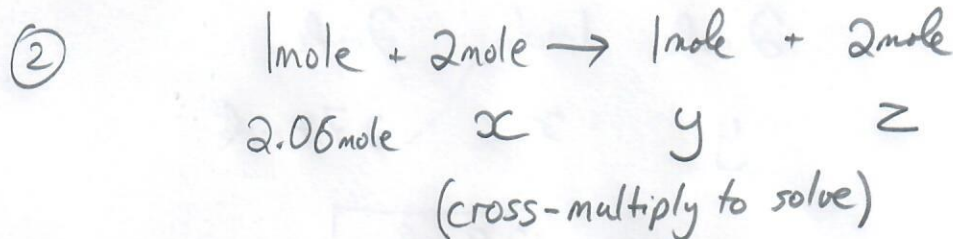
$$\boxed{P_{O_2} = 200 \text{ kPa}}$$

2. For all following questions refer to the following equation:



a) How many moles of each substance do you have if 33 g of methane (CH_4) is combusted at SATP

$$\textcircled{1} \quad n_{\text{CH}_4} = \frac{m}{M} = \frac{33}{16} = \underline{\underline{2.06 \text{ moles}}}$$



$$\begin{array}{l} x = 4.12 \text{ moles O}_2 \\ y = 2.06 \text{ moles CO}_2 \\ z = 4.12 \text{ moles H}_2\text{O} \end{array}$$

b) At SATP what volume of oxygen would be needed to react completely with 33 g of methane (CH_4).

O₂

$$PV = nRT$$

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

$$V = \frac{4.12(8.31)(298)}{101.3}$$

$$\boxed{V = 100.7 \text{ L}}$$

c) If the partial pressure of oxygen is 66.7 kPa, what will be the total pressure of the reactants?

$$\textcircled{1} \quad n_T = n_{\text{CH}_4} + n_{\text{O}_2}$$

$$n_T = 2.06 + 4.12$$

$$\underline{\underline{n_T = 6.18 \text{ moles}}}$$

$$\textcircled{2} \quad P_{\text{O}_2} = \frac{n_{\text{O}_2} \cdot P_T}{n_T}$$

$$66.7 = \frac{(4.12)(P_T)}{6.18}$$

$$\boxed{P_T = 100.1 \text{ kPa}}$$