

Calculate the mass of 22650 L of oxygen gas at 25.0 C and 1.18 atm pressure.



* Volume of a 10'x10'x8' room

- 1 - Convert volume of oxygen gas to moles using ideal gas equation
- 2 - Convert moles oxygen gas to mass using formula weight.

$$PV = nRT$$

$$P = 1.18 \text{ atm}$$

$$T = 25.0^\circ\text{C} = 298.2 \text{ K}$$

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

$$V = 22650 \text{ L}$$

$$n = ? \text{ mol O}_2$$

$$R = 0.08206 \frac{\text{L}\cdot\text{atm}}{\text{mol}\cdot\text{K}}$$

$$\textcircled{1} n_{\text{O}_2} = \frac{(1.18 \text{ atm})(22650 \text{ L})}{\left(0.08206 \frac{\text{L}\cdot\text{atm}}{\text{mol}\cdot\text{K}}\right)(298.2 \text{ K})} = 1092.222357 \text{ mol O}_2$$

$$32.00 \text{ g O}_2 = \text{mol O}_2$$

$$\textcircled{2} 1092.222357 \text{ mol O}_2 \times \frac{32.00 \text{ g O}_2}{\text{mol O}_2} = \boxed{35000 \text{ g O}_2} \begin{matrix} 35.0 \text{ kg} \\ \sim 77 \text{ lb} \end{matrix}$$



If 48.90 mL of hydrochloric acid solution react with sodium carbonate to produce 125.0 mL of carbon dioxide gas at 0.950 atm and 290.2 K. What is the molar concentration of the acid?

We need to find out M of HCl: $M_{\text{HCl}} = \frac{\text{mol HCl}}{\text{L HCl solution} \leftarrow 48.90 \text{ mL} = 0.04890 \text{ L}}$

- 1 - Convert 125.0 mL of carbon dioxide gas to moles using ideal gas equation.
- 2 - Convert moles carbon dioxide to moles HCl using chemical equation.
- 3 - Calculate molarity of HCl using the moles HCl and the volume.

① $n = \frac{PV}{RT}$ | $P = 0.950 \text{ atm}$ | $R = 0.08206 \frac{\text{L}\cdot\text{atm}}{\text{mol}\cdot\text{K}}$
 $V = 125.0 \text{ mL} = 0.1250 \text{ L}$ | $T = 290.2 \text{ K}$

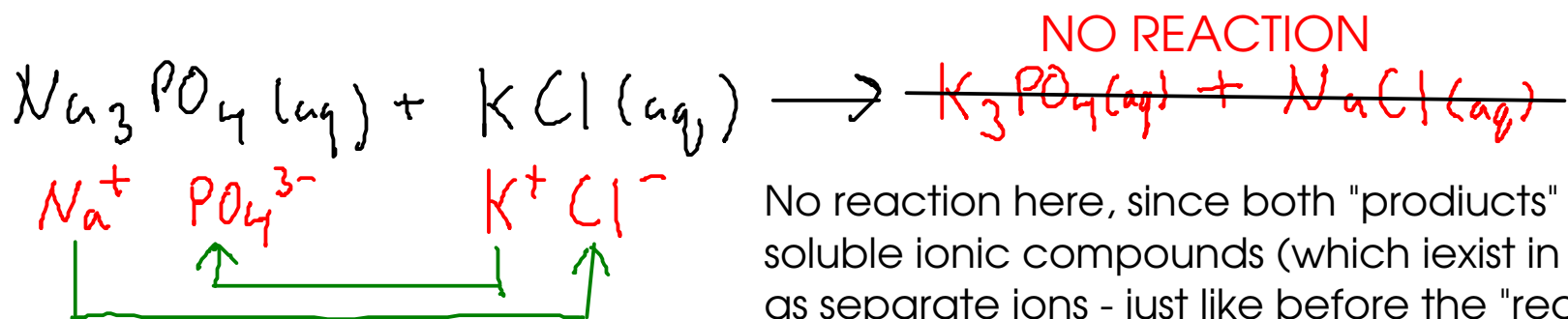
$$n_{\text{CO}_2} = \frac{(0.950 \text{ atm})(0.1250 \text{ L})}{\left(0.08206 \frac{\text{L}\cdot\text{atm}}{\text{mol}\cdot\text{K}}\right)(290.2 \text{ K})} = 0.0049866019 \text{ mol CO}_2$$

$$2 \text{ mol HCl} = \text{mol CO}_2$$

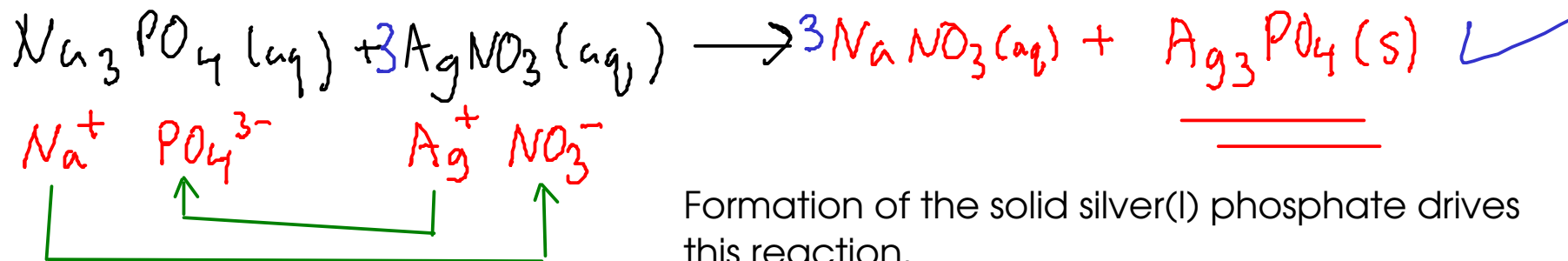
② $0.0049866019 \text{ mol CO}_2 \times \frac{2 \text{ mol HCl}}{\text{mol CO}_2} = 0.0099732038 \text{ mol HCl}$

③ $M_{\text{HCl}} = \frac{\text{mol HCl}}{\text{L HCl solution}} = \frac{0.0099732038 \text{ mol HCl}}{0.04890 \text{ L}} = \boxed{0.204 \text{ M HCl}}$

Here are the sample exchange reactions we did in class for review today:



No reaction here, since both "products" are soluble ionic compounds (which exist in water as separate ions - just like before the "reaction"!)



Formation of the solid silver(I) phosphate drives this reaction.