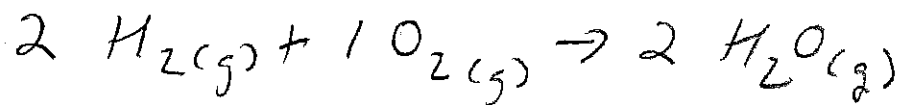


Gas Generation Problem - Gas Law $\rightarrow$ Stoichiometry



2.05 L of water vapor @ 35.0°C and 454 mmHg was generated from the above chemical reaction.

If you assume extra H_2 , how many grams of oxygen gas did you need to react?

1. Using Gas Law (Ideal) to convert to mol $\text{H}_2\text{O}(\text{g})$

$$PV = nRT \Rightarrow n = \frac{PV}{RT} = \frac{(0.597 \text{ atm})(2.05 \text{ L})}{(0.0821 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}})(308 \text{ K})}$$

$$R = 0.0821 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}}$$

$$(0.0821 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}})(308 \text{ K})$$

$$T = 35.0^\circ\text{C} + 273 = 308 \text{ K}$$

$$n = 0.04839 \text{ mol H}_2\text{O}$$

$$P = (454 \text{ mmHg}) \left(\frac{1 \text{ atm}}{760 \text{ mmHg}} \right) = 0.597 \text{ atm}$$

$$\text{mm O}_2: 2(16 \text{ g}) = \frac{32 \text{ g O}_2}{1 \text{ mol O}_2}$$

$$(0.04839 \text{ mol H}_2\text{O}) \left(\frac{1 \text{ mol O}_2}{2 \text{ mol H}_2\text{O}} \right) \left(\frac{32 \text{ g O}_2}{1 \text{ mol O}_2} \right) = 0.7742 \text{ g O}_2$$

$$= \boxed{0.774 \text{ g O}_2}$$