

**General Chemistry**  
**Mr. MacGillivray**  
**Quiz #27:**  
**Gas Stoichiometry**

Solve the following problems, which refer to the chemical equation shown below. Show all work.



1. How many liters (at STP) of water vapor can be produced from the complete combustion of 10.0 g of propane gas ( $\text{C}_3\text{H}_8$ )?

$$10.0 \text{ g C}_3\text{H}_8 \times \frac{1 \text{ mol C}_3\text{H}_8}{44.08 \text{ g C}_3\text{H}_8} \times \frac{4 \text{ mol H}_2\text{O}}{1 \text{ mol C}_3\text{H}_8} \times \frac{22.4 \text{ L}}{1 \text{ mol H}_2\text{O}} = 20.3 \text{ L}$$

$(3 \times 12) + (8 \times 1.01) = 36 + 8.08 = 44.08$

2. Re-calculate the answer to #1, assuming that the reaction is carried out at 100 degrees Celsius and 1.30 atm of pressure.

$$20.3 \text{ L} = V_1 \quad V_2 = ?$$

$$273 \text{ K} = T_1 \quad T_2 = 100 + 273 = 373 \text{ K}$$

$$1 \text{ atm} = P_1 \quad P_2 = 1.30 \text{ atm}$$

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

$$\frac{(1 \text{ atm})(20.3 \text{ L})}{273 \text{ K}} = \frac{(1.30 \text{ atm})V_2}{373 \text{ K}}$$

$$V_2 = 21.4 \text{ L}$$