AP Chemistry
Ms. Ye

Name _____
Date _____Block_____

Gas Stoichiometry WS

Remember: the **COEFFICIENTS** of the balanced equation tells you the relative number of **MOLES** of each reactant and product!

Part 1: Gases at STP

One mol of any gas at STP occupies a volume of _____ L . *How do you write this as a conversion factor?*

For the following reaction: $N_2(g) + 3\ H_2(g) \rightarrow 2\ NH_3(g)$

a. What volume of nitrogen at STP would be required to react with 0.100 mol of hydrogen?

b. What volume of nitrogen at STP would be required to react with 0.100 g of hydrogen to produce ammonia?

Part 2: Gases not at STP

If reactions do not occur at STP, you will need to use the ideal gas law and stoichiometry.

For the following reaction: $N_2(g) + 3\ H_2(g) \rightarrow 2\ NH_3(g)$

a. What volume of nitrogen at 215°C and 715 mmHg would be required to react with 0.100 mol of hydrogen?

b. What volume of nitrogen at 215°C and 4.56 atm would be required to produce 75.3 g of ammonia?

Part 3: Mixed Problems & Limiting Reactants

a. What volume of dry NO(g) at STP could be produced by reacting 8.74 g of Cu with and excess of HNO_3 ?

$$3\ Cu + 8\ HNO_3 \rightarrow 3\ Cu(NO_3)_2 + 2NO\ (g) + 4\ H_2O\ (l)$$

b. What volume of hydrogen would be required to produce 0.400 mole of HCl at 35°C and 0.965 atm?

$$H_2\ (g) + Cl_2\ (g) \rightarrow 2\ HCl\ (g)$$

c. If 0.500 mole of carbon disulfide reacts with oxygen completely according to the following reaction what would the total volume of the products be at 25°C and 4.23 atm?

$$CS_2\ (l) + 3\ O_2\ (g) \rightarrow CO_2\ (g) + 2\ SO_2\ (g)$$

d. For the following reaction:

$$2\ Al\ (s) + 6\ HCl\ (aq) \rightarrow 2\ AlCl_3\ (aq) + 3\ H_2\ (g)$$

i. If 13.5 g of aluminum is reacted with excess hydrochloric acid in a 2.0 L bottle at 26°C, what would the pressure be?

ii. When 10.7 g of Al are reacted with 42.5 g of HCl, what volume of H_2 will be produced at 47°C and 725 mmHg?