Gas Law Stoichiometry Extra Practice

Part 1

Not all stoichiometry problems have to be limiting reagent problems. If the question defines that one of the reactant is in excess, you are being told that the limiting reagent is the *other* reactant. Use this to solve the first three warm-up problems.

$$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$$

1. When 3.00 moles of N_2 react with excess hydrogen, how many moles of NH_3 are formed?

2. When 8.59 moles of H_2 react with excess N_2, how many moles of NH_3 are formed?

3. How many moles of H_2 are needed to form 16.7 moles NH_3 in the presence of excess N_2?

Part 2

Using the following balanced chemical equation, solve for the total number of moles in the final reaction mixture for each set of starting amounts for the reagents. The reaction is run at 273.15 K and 1 atm pressure.

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

1. 4.00 moles of H_2 and 8.00 moles Cl_2

2. 6.00 moles H_2 and 4.00 moles Cl_2

3. 12.0 L H_2 and 20.0 L Cl_2

Part 3

Solve the next three questions using the following balanced chemical equation:

$$C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$$

1. 12.6 L of C_3H_8 and 25.2 L of O_2 react to completion. What is the final volume of all gases, assuming constant temperature and pressure?

2. 1.35 moles of C_3H_8 and 8.51 moles O_2 react to completion. What is the final volume if all the gases in the final reaction mixture are carefully stored at 400 K and 2.54 atm?

3. This same reaction is run at a much colder temperature to ensure that the water produced by the reaction is in the liquid phase. Now you react 8.55 L of C_3H_8 with 18.5 L O_2. What is the total volume of all species in the final reaction mixture?