Chemistry 105 - Gas Stoichiometry and Mixtures

1. If 1.0×10^3 g of uranium are converted to gaseous UF_6 what pressure of UF_6 would be observed at 32˚C in a chamber that has a volume of 3.0×10^2L?

2. $Ni(CO)_4$ can be made by reacting finely divided nickel with gaseous CO. If you have CO in a 1.50 L flask at a pressure of 418 mm Hg at 25.0˚C, what is the maximum number of grams of $Ni(CO)_4$ that can be made?

3. If boron hydride B_4H_{10} is treated with pure oxygen it combusts to give B_2O_3 and H_2O.

$$2\ B_4H_{10(g)} + 11\ O_{2(g)} \rightarrow 4\ B_20_{3(s)} + 10\ H_2O_{(g)}$$

If a 0.050 g sample of the boron hydride burns completely in O_2, what will be the pressure of gaseous water in a 4.25 L flask at 30.0˚C?

4. Hydrazine reacts with 0_2 according to the equation

$$N_2H_{4(g)} + 0_{2(g)} \rightarrow N_{2(g)} + 2\ H_20_{(g)}$$

Assume the $0_{2(g)}$ to combust the hydrazine is in a 450 L tank at 26˚C. If you wish to combust completely a 1.0×10^1 kg sample of hydrazine, to what pressure should you fill the 0_2 tank in order to have sufficient oxygen?

5. Butane can be used as a fuel in an automobile engine. It burns in 0_2 according to the equation

$$2\ C_4H_{10(g)} + 13\ O_{2(g)} \rightarrow 8\ CO_{2(g)} + 10\ H_20_{(g)}$$

If one cylinder of the engine is filled with butane to a pressure of 1.5 atm at 500˚C, it requires 2.45 g of 0_2 for complete combustion. How many grams of 0_2 would be required if the cylinder were filled with butane at a total pressure of 2.0 atm at 500˚C?

6. Hydrogen can be made in the "water gas reaction."

$$C(s) + H_20_{(g)} \rightarrow H_{2(g)} + CO(g)$$

If you begin with 250 L of gaseous water at 120˚C and 2.0 atm pressure, how many grams of H_2 can be made?

7.* What is the pressure in atmospheres of a gas mixture that contains 1.0 g of H_2 and 8.0 g of Ar in a 3.0-L container at 27˚C?

8. A 3.0-L glass bulb containing He at 145 mm Hg is connected by a valve to a 2.0 L glass bulb containing Ar at 355 mm Hg. Calculate the partial pressure of each gas and the total pressure after the valve between the flasks is opened.