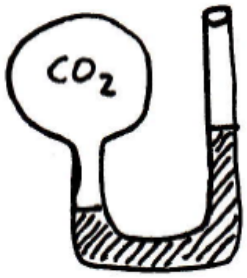
Name:_____Locker/Seat#_____ MW or TuTH

Chapter 5 Practice – Gases (HW – Due at Start of Lecture Monday 4/24)

1. A sample of 12.07 cm^3 of gaseous CO_2 is in a closed vessel connected to a tube with a column of mercury open at one end. The pressure of the CO_2 in the vessel is 1.34 atm. How many mm of Hg should be added to the open end in order to decrease the volume of CO_2 to 11.87 cm^3? (Assume the temperature is constant and P_{atm} = 1.00 atm)



2. Suppose that an ocean of mercury replaced all the air of the earth. How deep would this ocean have to be to exert the same pressure as the air?

3. Suppose that an ocean of water replaced all the air of the earth. How deep would this ocean have to be to exert the same pressure as the air?

4. A weather balloon filled with helium has a volume of 1.0×10^4 L at 1.00 atm and 30.0°C. It ascends to an altitude at which the pressure is only 0.60 atm and the temperature is -20.0°C. What is the volume of the balloon then? (Assume the balloon stretches in a way that the pressure inside stays close to that of the outside.)

6. Convert the gas constant 8.314 J/mol-K into units of L*atm/mol*K – show your work clearly! (No credit for simply writing the answer)

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7. A gas mixture in a closed 1.50-Liter vessel at 25.0°C contains 4.5 mol of $Br_2(g)$ and 33.1 mol of $F_2(g)$.
(a) Compute the partial pressure of $Br_2(g)$ in the mixture and the total pressure.

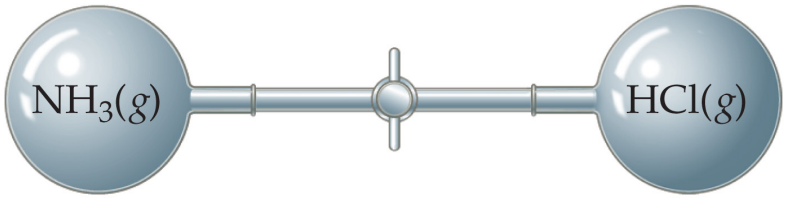
(b) Then, the following reaction occurs:

$$\mathbf{Br_2(g) + 5F_2(g) \rightarrow 2BrF_5(g)}$$

The reaction is stopped when 2.0 mol of BrF_5 are present. Determine the mole fraction of Br_2 in the new mixture at that point. What is the total pressure?

8. Ammonia and hydrogen chloride react to form solid ammonium chloride,

$$\mathbf{NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)}$$



Two 2.50-L flasks at 25.0°C are connected by a valve, as shown in the drawing. One flask contains a Presssure of $NH_3(g)$ of 2.87 atm, and the other contains HCl(g) at a pressure of 1.34 atm. The stopcock is opened and the gases react until one is completely consumed.

What will be the final pressure of the system after the reaction is complete? (Neglect the volume of the ammonium chloride formed.)