CHM151 Quiz 5a 25 Pts Spring 2019 Name: Key

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R = 62.4 L·torr/mol·K R = 0.0821 L·atm/mol·K PV = nRT $P_1V_1T_2 = P_2V_2T_1$

1. [redacted] The lid is tightly sealed on a rigid flask containing 2.00 L O_2 at 15°C and 0.723 atm. If the flask is heated to 55°C, what is the pressure in the flask?

$P_1V_1T_2 = P_2V_2T_1$

$(0.723\ atm)(328K) = P_2(288K)$

$P_2 = 0.823\ atm$ or $626\ mm\ Hg$ (torr)

2. [redacted] A sample of gas occupies 175 mL at 22°C and 218 mm Hg. What is the pressure of the gas if the volume is decreased to 122 mL and the temperature increased to 75°C?

$P_1V_1T_2 = P_2V_2T_1$

$(218\ mmHg)(175mL)(348K) = P_2(122mL)(295K)$

$P_2 = 369\ mm\ Hg$

3. [redacted] The pressure in a 10.0 L flask is 0.912 atm at 78°C. How many moles of gas are in the flask?

$PV = nRT$

$n = \frac{PV}{RT}$

$n = \frac{(0.912\ atm)(10.0L)(mol \cdot K)}{(0.0821 L \cdot atm)(351K)}$

$n = 0.316\ mol$

4. [redacted] Calculate the density (in g/L) of Ar at 305 K and 342 mm Hg.

Density = g ÷ L so using 1 mole of Ar → 39.95 g

Solve for volume:

$V = \frac{(1\ mol)(62.4\ L \cdot torr)(305K)}{(mol \cdot K)(342\ torr)} = 55.6\ L$

$Density = \frac{39.95g}{55.6L} = 0.718\ g/L$

5. [redacted] Ammonia gas is synthesized according to the balanced equation below.

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

If 2.50 L N_2 react with 7.00 L H_2, what is the theoretical yield (in liters) of NH_3? Assume that the volumes of reactants and products are measured at the same temperature and pressure.

$2.50\ L\ N_2 \left| \frac{2\ L\ NH_3}{1\ L\ N_2} \right. = 5.00\ L\ NH_3$

$7.00\ L\ H_2 \left| \frac{2\ L\ N_2}{3\ L\ H_2} \right. = 4.67\ L\ NH_3$

Base on L. Reactant

6. [redacted] A mixture of H_2 and Ne is placed in a 5.00 L flask at 20°C. The partial pressure of the H_2 is 1.4 atm and the partial pressure of the Ne is 2.1 atm. What is the mole fraction of H_2?

$\frac{1.4}{(1.4 + 2.1)} = 0.40$