Unit 9 Stoichiometry & Gas Laws Worksheet Name _____ Block ___

MUST SHOW WORK FOR CREDIT

1.) What volume of hydrogen gas at 580. mm Hg and 127°C is required to produce 0.895 g of NH_3? (R = 0.0821 L atm/ mol K)

$$1\ N_2\,(g) + 3\ H_2\,(g) \rightarrow 2\ NH_3\,(g)$$

Step 1: Covert grams of NH_3 to Moles of H_2

Step 2: Look at the Gas Law constant to determine units.

Step 3: Convert Temperature and Pressure to match the units of the Gas Law constant.

Step 4: Now rearrange the Ideal Gas Law equation to solve for Volume and substitute in the values.

2.) What volume of N_2 would be required to produce the NH_3 under the *same conditions* of temperature and pressure? (R = 0.0821 L atm/ mol)

$$1\ N_2\,(g) + 3\ H_2\,(g) \rightarrow 2\ NH_3\,(g)$$

Step 1: Covert grams of NH_3 to Moles of N_2. (Note everything stays the *same* except for moles N_2.)

Step 2: Look at the Gas Law constant to determine units.

Step 3: Convert Temperature and Pressure to match the units of the Gas Law constant.

Step 4: Now rearrange the Ideal Gas Law equation to solve for Volume and substitute in the values.

3.) What is the molar mass of a gas if 1.45 g occupies 830. mL at 735 mm Hg and 22.0 °C? (R = 0.0821 L atm/ mol K)

Step 1: Since R has units of atm, L, and K. You must convert Pressure, Volume, and Temperature.

Step 2: Since molar mass = grams/ mole, rearrange the Ideal Gas Law to solve for moles.

Step 3: Now take the number of grams from the word problem and divide by the number of moles to calculate the grams/mole for Molar Mass.

4.) What volume of hydrogen gas at STP is required to produce 85.0 g of NH_3? (R = 8.314 kPa L/ mol K)

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

Step 1: Covert grams of NH_3 to Moles of H_2. (Note everything stays the *same* except for moles N_2.)

Step 2: Look at the Gas Law constant to determine units.

Step 3: Convert Temperature and Pressure to match the units of the Gas Law constant.

Step 4: Now rearrange the Ideal Gas Law equation to solve for Volume and substitute in the values.

5.) A sample of nitrogen gas, N_2, is collected in a 100 mL container at a pressure of 688 mm Hg and a temperature of 565 °C. How many grams of nitrogen gas are present in this sample? (R = 8.314 kPa L / mol K)

Step 1: Look at the Gas Law constant to determine units.

Step 2: Convert the Volume, Temperature, and Pressure to match the units of the Gas Law constant.

Step 3: Solve Ideal Gas Law for number of moles.

Step 3: Use the molar mass of nitrogen gas to covert to grams.

6.) Determine the molar mass of a gas that has a density of 2.18 g/L at 66°C and 720 mm Hg. (R = 8.314 kPa L / mol K)

Step 1: Look at the Gas Law constant to determine units.

Step 2: Convert the Volume, Temperature, and Pressure to match the units of the Gas Law constant.

Step 3: Solve Ideal Gas Law for number of moles.

Step 3: Use the grams from the density and the moles from above to solve for molar mass.

Challenge: What is the density of chlorine gas at STP?