**Name: Unit 7: Gases (Chapter 10)**

**AP Chemistry Homework packet**

**Friday: The Ideal Gas Law**

**Sections 10.4, 10.5, and 10.9;** textbook pgs 383-398 + 409-411; test prep pgs 179-181 + 184-185

1. What is the difference between an ideal gas and a real gas?
2. What is STP, and what is the molar volume of a gas at STP?
3. What is the ideal gas equation? Write the equation, then show how the equation can be rearranged to find pressure, volume, moles, and temperature (you should write 5 equations total).
4. The constant “R” may be written different ways depending on which units are used. Write the three most common values for R below (units are given for you)

a. \_\_\_\_\_\_\_\_\_ J / (mol\*K) b. \_\_\_\_\_\_\_\_\_ (L \* atm)/(mol\*K) c. \_\_\_\_\_\_\_\_ (L \* mmHg) / (mol \* K)

1. If you have 4 moles of a gas at a pressure of 5.6 atm and a volume of 12 liters, what is the temperature?
2. If you have an unknown quantity of gas at a pressure of 1.2 atm, a volume of 31 liters, and a temperature of 87 0C, how many moles of gas do you have?
3. If you contain 3 moles of gas in a container with a volume of 60 liters and at a temperature of 400 K, what is the pressure inside the container?
4. How do you find the density of a gas?
5. What is the density of N2O at 1.53 atm and 45.2°C, in g/L?
6. What is the molecular weight of a gas (in g/mol) if 3.5 g of the gas occupies 2.1 L at STP?
7. The volume of a sample of gas (2.49 g) was 752 mL at 1.98 atm and 62°C. Which of the following could be the gas? Explain your answer.

A) SO2

B) SO3

C) NH3

D) NO2

E) Ne

**Monday: Partial Pressure**

Section 10.6; textbook pages 399 – 402; test prep pages 181 – 183

1. Explain Dalton’s law of partial pressures in your own words.
2. What does “mole fraction” mean in relation to gases, and how can you use it to calculate partial pressure for a gas?
3. A vessel contains N2, Ar, He, and Ne. The total pressure in the vessel was 987 torr. The partial pressures of nitrogen, argon, and helium are 44.0, 486, and 218 torr, respectively. What is the partial pressure of neon in the vessel (in torr)?
4. 10.0 grams of argon and 20.0 grams of neon are placed in a 1200.0 ml container at 25.0°C. What is the partial pressure of neon (in atm)?
5. **a.** The air we breathe is roughly 78% nitrogen gas (N2), 21% oxygen gas (O2), and 3% other gases.

At a standard pressure of 1 atm, what is the partial pressure of oxygen gas in our atmosphere?

**b.** At high altitudes, atmospheric pressure is significantly lower than it is on the ground. On top of Mount Everest, atmospheric pressure is only 0.333 atm. Assuming that oxygen is still 21% of the atmosphere at the top of Mount Everest, what would the partial pressure of oxygen be at that altitude?

**Tuesday:** **Molecular Effusion, Diffusion, and Kinetic Energy**

Sections 10.7 – 10.8; textbook pages 402 – 409; test prep pages 184 – 185

1. What is the difference between effusion and diffusion?
2. How are rates of effusion and diffusion related to temperature?
3. The kinetic energy of a gas is given by the equation: KE = **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
4. A molecular speed distribution for four noble gases (He, Ne, Ar, and Xe) is shown below. Label the diagram to show which gas is represented by each curve, and explain your answer.



1. What is Graham’s law of effusion? Write the formula and explain it in your own words.
2. A sample of N2 gas (2.0 mmol) effused through a pinhole in 5.5 s. Calculate the time (in seconds) it would take for the same amount of CH4 to effuse under the same conditions.
3. A sample of O2 gas (2.0 mmol) effused through a pinhole in 5.0 s. Calculate the time (in seconds) it would take for the same amount of CO2 to effuse under the same conditions.