Name: _____ *Date:* _____

Unit 3.4

Ideal Gas Law

1. Suppose you have two identical 1.0 L sealed containers. Both containers are kept at exactly 25˚C. One vessel contains only neon gas at 1.5 atm, and the other contains only xenon gas at 1.9 atm. is the value for the moles of neon less than, equal to, or great than that of xenon? Explain.

2. A container is filled with argon gas at -48˚C and sealed. After sitting on a lab bench at room temperature for several minutes, the lid blows off and the gas escapes. Explain why this happened.

3. What volume of space would 2.68 moles of CO_2 gas occupy at 85˚C and 795 mm Hg?

4. How many moles of gas can be contained in 32.0 L of space at 25˚C and 1.00 atm?

5. How many moles of gas can be contained in 13.74 liters of space at 1.05 atm and 303 K?

6. The density of an unknown gas is found to be 2.45 g/L at 20.0°C and 1.00 atm. Find the molar mass of the gas.

7. A gaseous hydrocarbon (a compound that contains only hydrogen and carbon) is found to be 11% hydrogen by mass.

   (a) Find the empirical formula of the compound.

   (b) Find the molar mass of the hydrocarbon, if it has a density of 3.16 g/L at 1.43 atm and 25°C.

   (c) Find the molecular formula of the compound.

8. The total pressure inside a 1.62 L cylinder kept at 35°C is 1.15 atm. If the volume of the cylinder drops to 0.74 L and the temperature remains the same, what is the new pressure inside the cylinder?

9. Suppose you have two identical 1.0 L cylinders. Both cylinders are kept at exactly 25°C. One cylinder contains 0.3 moles of helium gas and the other contains 0.3 moles of xenon gas.

   (a) Is the pressure in the cylinder containing helium gas less than, equal to, or greater than that of xenon? Justify your answer without performing any calculations. (Hint: Manipulate the ideal gas equation.)_

   (b) If the volume of the cylinder containing xenon is reduced to 0.25 L and the temperature remains the same, what happens to the pressure inside the cylinder? Justify your answer by manipulating the combined gas law equation.

10. A rigid 3.4 L sealed vessel contains 0.124 mol $H_2(g)$, 0.132 mol $O_2(g)$ and 0.0820 mol Kr(g). The total pressure in the vessel is 2.32 atm.

    (a) Find the mole fraction of each gas.

    (b) Find the partial pressure exerted by each gas.

11. A rigid 3.80 L sealed vessel contains 0.650 mol Ne, 0.321 mol Kr and 0.190 mol Xe. Find the density of the mixture in g/L.

12. A rigid sealed 3.70 L vessels contains 0.12 mol He(g) and 0.24 mol Ne(g) at 25˚C. What is the total pressure of the vessel? (Hint: You can do this in one step.)

13. Oxygen was produced in a reaction and collected over water. A 136.1 mL sample of gas was collected over water at 25˚C and 1.06 atm. The vapor pressure of water is 23.76 mm Hg at 25˚C. Find the mass of oxygen collected.