Unit 10 – Chapter 5: Gas Laws **Name** _____

Take Home Quiz #2 **Period** _____

1) Freon-12 (CF_2C_{12}) is commonly used as the refrigerant in central home air conditioners. The system is initially charged to a pressure of 70 psi. Express this pressure in each of the following unit. (Remember: 1 atm = 14.7 psi.)

    a. mm Hg

    b. atmospheres

    c. Pascals

    d. kilopascals

2) An ideal gas is contained in a cylinder with a volume of 500 mL at a temperature of 30.0^0C and a pressure of 710 torr. The gas is compressed to a volume of 25 mL and the temperature is raised to 820^0C. What is the new pressure, in torr, of the gas?

3) A 5.0-liter flask contains 0.60 grams of O_2 at a temperature of 22^0C. What is the pressure, in atmospheres, inside the flask?

4) A balloon has a volume of 175 mL at 19^0C. At what temperature, in ^{0}C, will the volume of the balloon have increased by 25% at a constant pressure?

5) Butane reacts with oxygen in the following reaction:

    $C_4H_{10} + O_2 \rightarrow CO_2 + H_2O$ **(UNBALANCED)**

    If 75.2 grams of butane reacts with 21.2 grams of oxygen, calculate the volume of carbon dioxide produced at 25^0C and 780 torr of pressure.

6) A sample containing 15.0 grams of dry ice, $CO_{2(s)}$, is put into a balloon and allowed to sublime according to the following equation:

$$CO_{2(s)} \rightarrow CO_{2(g)}$$

What will the volume of the balloon be at 22.0^{0}C and 1.04 atm after all the dry ice has sublimed?

7) 0.500 liters of $H_{2(g)}$ are reacted with 0.600 liters of $O_{2(g)}$ at STP according to the equation:

$$2\ H_{2(g)} + O_{2(g)} \rightarrow 2\ H_2O_{(g)}$$

What volume will the H_2O occupy at 1.00 atm and 350^{0}C?

8) At 0^{0}C, a 1.0-liter flask contains 0.005 moles of $N_{2(g)}$, 150 mg $O_{2(g)}$, and $NH_{3(g)}$ at a concentration of 5.0 X 10^{18} molecules/cm^3. What is the total pressure of the flask?

9) A compound contains only nitrogen and hydrogen, and it is 87.4% nitrogen by mass. A gaseous sample of the compound has a density of 0.977 g/liter at 710.0 torr and 100.0^{0}C. What is the molecular formula of the compound?

10) Oxygen gas can be produced in small quantities in the laboratory from the thermal decomposition of potassium chlorate:

$$2\ KClO_{3(s)} \rightarrow 2\ KCl_{(s)} + 3\ O_{2(g)}$$

If 3.7 grams $KClO_3$ is heated, what dry volume of gas will be collected over water at 27^{0}C and 735 torr? (At 27^{0}C the vapor pressure of water is 26.7 torr.)

11) Calculate the 1) average kinetic energy and 2) root mean square velocity of N_2 molecules at 273 K and again at 546 K.