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

Practice Problems **Period _____**

_____ 1. If a barometer were built using water instead of Hg, how high would the column of water be if the pressure were 1 atm, knowing that the density of water is 13.6 times lower than that of mercury?

a. 10.3 m
c. 20.0 m
b. 3.17 m
d. 33.0 m

_____ 2. Calculate the pressure, in Pascals, for a column of Hg that is 2.05 m high.

a. 2.35×10^5 Pa
c. 1.56×10^6 Pa
b. 2.70 Pa
d. 2.73×10^5 Pa

_____ 3. What is the pressure, in mm Hg, of a gas that has a pressure of 15.0 lb/in^2?

a. 0.113 mm Hg
c. 1.02 mm Hg
b. 776 mm Hg
d. 27.6 mm Hg

_____ 4. A balloon with an internal pressure of 300.0 torr rises to a height of 30,000 feet, where the pressure is 15.0 torr. Assuming temperature remains constant, by what ratio did the volume change?

a. 25:1
c. 20:1
b. 1000:1
d. 1.85:1

_____ 5. A 0.90-L sample of helium is heated from 68^0F to 68^0C. At constant pressure, what volume does this sample occupy at 68^0C?

a. 1.1 L
c. 0.9 L
b. 1.6 L
d. 2.7 L

_____ 6. A 3.00-L sample of xenon is heated from 100^0F to 200^0F and an initial pressure of 70.0 cm increased to 120 cm of Hg. What is the final volume, in L, of the gas?

a. 1.80 L
c. 3.00 L
b. 2.06 L
d. 6.00 L

_____ 7. How many moles of an ideal gas are present in a sample of 1.25 L at 311 K and a pressure of 2500 lb/in^2?

a. 8.35 mol
c. 32.8 mol
b. 5.10 mol
d. 1.02 mol

_____ 8. A 3.25-L sample of a gas at 80.0^0C is heated until a final volume of 32.5 L is reached. What is the final temperature of the gas in Kelvin at constant pressure?

a. 3.53×10^3 K
c. 1.08×10^3 K
b. 151 K
d. 1.34×10^3 K

_____ 9. Calculate the number of grams of acetylene, C_2H_2, in a 30.0 L cylinder at a temperature of 20.0^0C and a pressure equal to 2500 lb/in^2.

a. 8.47×10^3 g
c. 5.52×10^3 g
b. 1000 g
d. 2.40×10^3 g

_____ 10. The average pressure of carbon dioxide in the atmosphere is 25.1 torr at 273 K. Assuming that our atmosphere is 50 miles high and the temperature and pressure of carbon dioxide constant in this region, calculate the mass of the gas in tons. The radius of the earth is 3963.0 miles.

a. 3.0×10^{15} tons
c. 4.8×10^{6} tons
b. 50,000 tons
d. 6.9×10^{9} tons

_____ 11. A 50.0 L cylinder at temperature of 47^0C and a pressure of 50.0 atm contains how many molecules of gas per cm^3?

a. 5.73×10^{23}
c. 2.30×10^{19}
b. 2.30×10^{22}
d. 6.75×10^{18}

_____ 12. A 50.0 L cylinder of Cl_2 at 20.0^0C and a pressure of 103,401 torr springs a leak. The following day the pressure is found to be 41,361 torr. How many moles of chlorine gas escaped during this time?

a. 170 mol
c. 85.0 mol
b. 280 mol
d. 113 mol

_____ 13. Tin reacts with hydrochloric acid to produce hydrogen gas and tin (II) chloride. How many liters of hydrogen gas are produced at 27.0^0C and a pressure of 710 torr, if 2.80 g of tin reacts with excess hydrochloric acid? $Sn_{(s)} + 2\ HCl_{(aq)} \rightarrow SnCl_{2(aq)} + H_{2(g)}$

a. 0.620 L
c. 2.00 L
b. 0.320 L
d. 1.25 L

_____ 14. How many cm^3 of carbon tetrachloride are produced when 8.0 L of chlorine are allowed to react with 0.75 L of methane at STP? $4\ Cl_{2(g)} + CH_{4(g)} \rightarrow 4\ HCl_{(g)} + CCl_{4(g)}$

a. 1500 cm^3
c. 360 cm^3
b. 750 cm^3
d. 1080 cm^3

_____ 15. Calculate the final pressure, in atm, after 9.06 g of krypton reacts with 10.0 g of fluorine at 300 K in a 10.0 L container. $Kr_{(g)} + F_{2(g)} \rightarrow KrF_{2(s)}$

a. 0.591 atm
c. 0.700 atm
b. 0.384 atm
d. 1.90 atm

_____ 16. Calculate the density change, g/L, if 700 g of $C_2H_{6(g)}$ are removed from a 200. 0 L cylinder at 200.0 psi (lb/in^2) and a temperature of 20^0C.

a. 3.6 g/L
c. 1.7 g/L
b. 15.0 g/L
d. 16.2 g/L

_____ 17. Calculate the density, in g/L, of sulfur $dioxide_{(g)}$ at 37^0C and a pressure of 1440 torr.

a. 6.0 g/L
c. 2.38 g/L
b. 0.60 g/L
d. 4.76 g/L

_____ 18. Calculate P_t, in atms, for three different gases at partial pressures of 144.0 cm, 800.0 mm, and 1.3 m of Hg.

a. 1.90 atm
c. 1.06 atm
b. 2.58 atm
d. 4.66 atm

_____ 19. 1.0 L of hydrogen gas is collected over water at 308 K at a pressure of 728 torr. How many grams of iron are required to react with excess $HCl_{(aq)}$ to produce this volume of hydrogen gas? The vapor pressure of water is 42.4 torr. The products of the reaction are iron (II) chloride and hydrogen gas.

a. 4.7 g
c. 2.0 g
b. 2.35 g
d. 1.3 g

_____ 20. Gas A diffuses twice as fast as gas B. Gas B has a molecular weight = 60.0 g/mol. What is the molar mass of gas A?

a. 15.0 g/mol
c. 30 g/mol
b. 120 g/mol
d. 90 g/mol

_____ 21. If gas B effuses four times as fast as gas A, what is the ratio of the molar masses (A/B)?

a. 2:1
c. 16:1
b. 4:1
d. 8:1

_____ 22. The rate of effusion of freon-12 to freon-11 is 1.07:1. The molar mass of freon-11 is 137.4 g/mol. Calculate the molar mass, in g/mol, of freon-12.

a. 100 g/mol
c. 121 g/mol
b. 182 g/mol
d. 118 g/mol

_____ 23. Using the van der Waals equation, calculate the pressure exerted by 10.0 g of methane (CH_4) in a 2.1 L container at 330 K. a = 2.253 L^3 atm/mol^2, b = 0.0458 L/mol. Calculate using the ideal gas equation and find the difference between the ideal gas pressure and van der Waals pressure.

a. 2.0 atm
c. 0.1 atm
b. 0.5 atm
d. 1.5 atm