DQ 4.1 Name:_____ Date:_____

Multiple Choice:

1. Intermolecular forces (attractive forces) between gas molecules are most significant (strongest) at
   a. Low pressures and low temperatures
   b. Low pressures and high temperatures
   c. High pressures and high temperatures
   d. High pressures and low temperatures

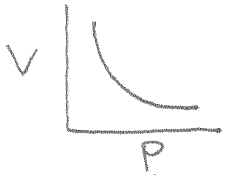
2. At a given temperature, molecules of different gases
   a. Have the same average kinetic energy
   b. Have the same average velocity
   c. Have the same diameter
   d. Have the same density
   e. Have identical masses

Short Answer:

3. If the temperature of a gas is held constant and volume of the gas is decreased, then what is the effect on the pressure of the gas?

   pressure increases

4. Sketch a graph that demonstrates the relationship between volume and pressure of a gas.



5. How many atmospheres are in 502 mmHg?

   .661 atm

6. Calculate the pressure, in atmospheres, of 20.0 g of F_2 gas in a 3.00 L tank at 30.0°C.

   4.36 atm

7. Calculate the density of methane, CH_4, at STP.

   .716 g/L

8. Why are gases easily compressed and solids are not?

   Gases are mainly empty space, molecules are far apart from one another. In solids, molecules are close together & do not have room to become closer together.

9. At a given temperature and pressure, which gas, F_2 or CF_4, would deviate more from ideal gas behavior (i.e. behave less like an ideal gas)? Justify your answer.

   CF_4 would deviate more from ideal gas behavior

DQ 4.2 Name:_____ Date:_____ Block:____

1. Suppose you have two 1-L flasks, one containing N_2 at STP, the other containing CH_4 at STP. How do these systems compare with respect to (a) number of molecules, (b) density, (c) average kinetic energy of the molecules, (d) rate of effusion through a pinhole leak? Defend your statements.

a) molecules N_2 = molecules CH_4

b) N_2 has higher density than CH_4

c) Average KE of N_2 & CH_4 are the same

d) CH_4 effuses faster than N_2

2. Chlorine dioxide gas (ClO_2) is used as a commercial bleaching agent. It bleaches materials by oxidizing them. One method of preparing ClO_2 is by the reaction of chlorine gas and sodium chlorite:

$$Cl_2(g) + 2\ NaClO_2(s) \rightarrow 2\ ClO_2(g) + 2\ NaCl(s)$$

If excess $NaClO_2$ is allowed to react with 2.00 L chlorine gas at a pressure of 1.50 atm at 21°C, how many grams of ClO_2 can be prepared?

16.7 g ClO_2

DQ 4.3 Name:_____ Date:_____

Multiple Choice:

1. Which of the following is **NOT** true of a system at equilibrium?
   a. the forward reaction and reverse reaction occur simultaneously
   b. the amount of reactants equals the amount of products
   c. the rate of the forward reaction equals the rate of the reverse reaction
   d. the amount of reactants and products remains constant

Short Answer:

2. What is the mathematical relationship between Kc and Kp?

$K_p = K_c (RT)^{\Delta n}$

3. Write the equilibrium constant (Kc) expression for the reaction below.

$2NO\ (g) + O_2\ (g) \leftrightarrow 2NO_2\ (g)$

$$K_c = \frac{[NO_2]^2}{[NO]^2[O_2]}$$

4. If the concentration of reactants in Question 3 is increased, then will the equilibrium constant increase, decrease, or stay the same? Explain your reasoning.

K will stay the same

5. If $K_c = 4.00 \times 10^3$ for the reaction in Question 3, then when equilibrium is established, will the amount of reactants present be greater than, less than, or equal to the amount of products present? Explain your reasoning.

Amount of Reactants will be less than the amount of Products present @ $\rightleftharpoons$

6. If the value of the equilibrium constant in Question 3 is 4.00×10^3 at 298 K, then what is the value of the equilibrium constant for the reaction below? (Show your work)

$4NO\ (g) + 2O_2\ (g) \leftrightarrow 4NO_2\ (g)$

$K_c = 1.60 \times 10^7$