Name Key

Date _____ Pd ___

Chemistry – Unit 8
Worksheet 1 – Gases Again

1. A can of spray paint contains nitrogen gas as the propellant. The pressure of the gas is 3.5 atm when the temperature is 20°C. The can is left in the sun, and the temperature of the gas increases to 50°C. What is the pressure in the can?

$P_1 = 3.5\ atm$ $P_2 = X$

$T_1 = 20°C + 273$ $T_2 = 50°C + 273$

$\frac{P_1}{T_1} = \frac{P_2}{T_2}$ $P_2 = 3.9\ atm$

2. A 90.0 mL volume of helium was collected under a pressure of 740 mmHg. At what volume would the pressure of this gas be 700 mm Hg? Assume temperature is constant.

$V_1 = 90.0\ mL$ $V_2 = X$ $P_1V_1 = P_2V_2$

$P_1 = 740\ mm$ $P_2 = 700\ mm$ $(740\ mm)(90.0\ mL) = (700\ mm)(X)$

$V_2 = 95.1\ mL$

3. A small bubble rises from the bottom of a lake, where the temperature is 8°C and the pressure is 6.4 atm, to the water's surface, where the temperature is 25°C and pressure is 1.0 atm. Calculate the final volume (in mL) of the bubble if its initial volume was 2.1 mL.

$T_1 = 8°C + 273$ $T_2 = 25C + 273$ $\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

$P_1 = 6.4\ atm$ $P_2 = 1.0\ atm$ $\frac{(6.4\ atm)(2.1\ mL)}{281\ K} = \frac{(1.0\ atm)(X)}{298\ K}$

$V_1 = 2.1\ mL$ $V_2 = X$

$V_2 = 14.3\ mL$

4. Three gases are mixed in a 1.00 L container. The partial pressure of CO_2 is 250 mm Hg, N_2 is 375 mm Hg, and He is 125 mm Hg. What is the pressure of the mixture of gases?

$P_1 + P_2 + P_3 \ldots = P_{total}$

$250\ mm + 375\ mm + 125\ m = 750\ mm\ Hg$

5. What are the percentages, by moles, of the gases in the above mixture?

$\frac{250}{750} \times 100 = 33\%\ CO_2$ $\frac{125}{750} \times 100 = 17\%\ He$

$\frac{375}{750} \times 100 = 50\%\ N_2$

6. Our atmosphere is a mixture of gases (roughly 79% N_2, 20% O_2 and 1% Ar). What is the partial pressure (in mm Hg) of each gas at standard pressure?

760 mm is Standard pressure

.79 x 760 = 600.4 mm N_2 .01 x 760 = 7.6 mm Ar

.20 x 760 = 152 mm O_2

7. A mixture of He and O_2 gases is used by deep-sea divers. If the pressure of the gas a diver inhales is 8.0 atm, what percent of the mixture should be O_2, if the partial pressure of O_2 is to be the same as what the diver would ordinarily breathe at sea level?

From above O_2 = 152 mm =

$\frac{1 \text{ atm}}{760 \text{ mm}} = \frac{x}{152}$ O_2 = 0.2 atm

0.2/8.0 x 100 = 2.5 % O_2

8. When you found the density of carbon dioxide gas, you collected the gas by displacing water in a bottle. The gas you collected was a mixture of CO_2 and H_2O vapor. If, on the day of the lab, the room pressure were 730 mm Hg and the partial pressure of water vapor were 21 mm Hg, what would be the partial pressure of the carbon dioxide gas? What fraction of the mixture was CO_2?

9. Suppose that when you reacted the zinc with the hydrochloric acid, you collected the hydrogen gas by water displacement. If the pressure in the room were 735 mm, and the partial pressure of the water were 22mm Hg, what would be the partial pressure of the hydrogen gas? If the volume at this pressure were 25.0 mL, what would be the volume of the hydrogen gas alone at standard pressure?