Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_ Date \_\_\_\_\_

Dalton’s Law, Ideal Gas Law, and STOICH

Show all of your work in completing the following problems. Record answers with the correct number of sig figs and units.

1. Determine the total pressure of a gas mixture that contains oxygen, nitrogen, and helium if the partial pressures of the gases are as follows: PHe = 18.0 kPa; PN 2 = 36.7 kPa; and PCO2 = 36.7 kPa.
2. A gas mixture containing oxygen, nitrogen, and carbon dioxide has a total pressure of 52.9 kPa.   
   If PO 2 = 3.6 kPa and PN 2 = 42.0 kPa, what is PCO 2?
3. A sample of oxygen is collected over water at 26 ºC. If the volume is measured as 34.8 mL and the pressure is 689 mmHg, determine the mass of O2. Use the table at the right to calculate the pressure of O2.

|  |  |
| --- | --- |
| Temp (ºC) | Pressure (mmHg) |
| 20.0 | 17.6 |
| 22.0 | 19.8 |
| 24.0 | 22.4 |
| 26.0 | 25.2 |

1. A rigid steel cylinder that has a volume of 20.0 L is filled with nitrogen gas (N2) to a final pressure of 2.00 X 104 kPa at 28 ºC. How many moles of N2(g) does the cylinder contain?
2. When the temperature of a rigid hollow sphere containing 685 L of helium gas is held at 621 K, the pressure of the gas is 1.89 X 103 kPa. How many moles of helium does the sphere contain?
3. A deep underground cavern contains 2.24 X 106 L of methane gas (CH4)(g) at a pressure of 1.50 X 103 kPa and a temperature of 42 ºC. How many kilograms of CH4 does this natural-gas deposit contain?
4. What volume will 12.0 g of oxygen gas (O2) occupy at 25 ºC and a pressure of 52.7 kPa?
5. Determine the volume (in L) occupied by 0.202 mol of a gas at standard temperature and pressure (STP).
6. How many oxygen molecules are in 3.36 L of oxygen gas at standard temperature and pressure (STP)?
7. What volume is occupied by 4.02 X 1022 molecules of helium gas at STP?
8. Determine the pressure of 15.0 g of argon gas in a 5.0L container at STP.
9. The following reaction occurs at STP. Determine the volume of chlorine gas produced when 15.0 g of PCl5 react. PCl5 → PCl3 + Cl2
10. How many moles of nitrogen gas are required to produce 165 g of ammonia (NH3)? What would the volume of nitrogen be at 28 ºC and 1 atm? N2 + 3 H2 → 2 NH3
11. Determine the mass of carbon dioxide produced when 75.8 L of butane (C4H10) reacts at STP?  
    2 C4H10 + 13 O2 → 8 CO2 + 10 H2O
12. What volume of oxygen gas is produced when 80.0 g of hydrogen peroxide decomposes at STP?

2 H2O2 → 2 H2O + O2