Section 16C – Partial Pressures

1) A sealed 5−L container has 1.25 moles N_2, 0.85 moles CCl_4, and 0.75 moles O_3. What is the mole fraction of each gas?

2) A 2.5−L container has a total of 3.0 moles of gas. If the mole fraction of O_2 is 0.40 and there are equal amounts of F_2 and Cl_2. What is the number of moles and mole fraction for each gas?

3) A container has a mixture of carbon dixoide, nitrogen, and formaldehyde. The pressures of each gas were 1.20 atm, 0.45 atm, and 0.60 atm respectively. What is the total pressure in the container?

4) The total pressure of a mixture of three gasses (A, B, C) is 1.35 atm. The mole fraction of each gas is $X_A = 0.25$, $X_B = 0.60$, and $X_C = 0.15$. What is the pressure of each gas in the mixture?

5) A container has 0.85 atm H_2 and 1.20 atm CO_2, what is the mole fraction of each gas in the container?

6) A 15.0 L container has 52.0 g carbon tetrafluoride and 48.0 g carbon monoxide. The container (thus the gasses held within) are at 35.0°C, what is the pressure of each gas and what is the total pressure?

7) The total pressure of a gas mixture in a 5.0 L container is 2.5 atm. The temperature of the container is 27.0°C. What is the mass of nitrogen gas in the container if there are twice as many moles of methane as nitrogen?

a) If you obtained 22.4 L of air at STP: **b)** How many moles of air would you have?

8) If air is 78.09% nitrogen, 20.95% oxygen, 0.93% argon, and 0.039% carbon dioxide, what is the mass of each of these gases in the 22.4 L of air you obtained?

9) A 1 L container contains 0.123 g of a gas mixture of helium and hydrogen. What is the mass of each gas if the total pressure is 1 atm with a temperature of 27°C?

1. The atmosphere is composed of about 78% N_2, 20% O_2, and 1% Ar. What is the pressure of each gas?
2. What is the pressure of each gas if 1.2 mol CO_2 and 4.3 mol Ne are mixed together at 35°C in a 10.0 L container?

3. What will the volume be if a balloon contains 2.3 atm of Ar and 1.7 atm methane at 50°C. There are 1.725 mol of Ar and 1.275 mol methane in the balloon.
4. What mass of nitrogen gas is in a balloon that contains 50.0 g CO_2 at 10°C with a volume of 1.0 L and a pressure of 2.0 atm?
5. The composition of the atmosphere is about 0.0035% carbon dioxide. If a 10.0 L sample of the atmosphere is taken at sea level, what is the partial pressure of CO_2 at 25°C? What mass of CO_2 is in the sample? What does this tell you about the fragility of the concentration of CO_2 in the air?

Lab – the molar mass of butane

Procedure

1) Fill a metallic tub or large beaker with water.

2) Measure the temperature of the water and note the barometric pressure of the room. I will give you the barometric pressure on the board.

3) Mass the disposable lighter to the nearest 0.01 g, it is important that you use a scale that has this type of accuracy.

4) Fill a 100 mL graduated cylinder with water and invert in the tub. Be sure that all the volume of the graduated cylinder is filled with water.

5) Hold the butane lighter under the opening for the graduated cylinder and depress the gas release valve.

6) Dispense about 90 mL of the butane then raise the graduated cylinder so that the 100 mL mark is at the surface of the water. This will ensure that the air pressure is the same as the pressure in the graduated cylinder.

7) Displace enough butane gas to fill the graduated cylinder to the 100 mL mark.

8) Remove the lighter from the water and use paper towel to dry off the lighter. Mass the lighter on the same scale used earlier.

Questions

1) Create a data table displaying the different masses found.

2) What is the molar mass of butane and how many moles of butane were dispensed in to the container? This will be your theoretical data

3) Find the vapor pressure of water at the temperatue you measured, use mmHg as your unit.

4) Determine the presssure of the butane in the beaker. The total pressure in the beaker is equal to the air pressure measured with the barometer.

5) Using the ideal gas law, determine the number of moles of the gas that were dispensed.
6) Using the experimental data, calculate the molar mass of the gas you dispensed.
7) Determine your percent error.
8) Share your data and we will determine the average and the standard deviation

Discussion

1) Knowing the formula and molar mass of butane, how well did our data correlate to the accepted value?
2) If you data does not correlate with the accepted value for the molar mass of butane, what are some reasons why this may be?
3) What is another experimental way to determine the molar mass of butane?
4) Why is butane used in lighters as opposed to some other fuel?