Chem11 Partial Pressure : W.S. - 80

Dalton's Law of Partial Pressures states that: "The total pressure of a mixture of gases is equal to the sum of the pressures of the component gases". Each gas can be treated like it was alone in the container.

Mathematically the law is : $\mathbf{P_{total} = P_a + P_b + P_c + ...}$

Also, since the pressure of any gas is proportional to the number of moles of the gas (at constant volume), then the partial pressure of any component gas is proportional to its percentage in the mixture.

Problems :

1) A container holds three different gases. The partial pressures are; 25 kPa, 42 kPa, and 63 kPa. Find the total pressure.

2) A tank holds two gases. The total pressure is 150. atm. If the partial pressure of one of the gases is 35 atm. Find the pressure of the other gas.

3) Using the Ideal Gas Law, (PV = nRT), show that the pressure of a gas is proportional to the number of moles. Assume V and T are constant.

4) A tank contains 32 moles of N_2 gas and has a pressure of 8.0 atm. If 4.0 moles of Ne are added, find the new pressure. Assume T is constant

5) A glass bulb contains one mole of argon and two moles of helium. If the total pressure is 81.0 kPa, find the partial pressure of each gas.

6) The percentages of the two major gaseous components of air are : O_2; 21.0 % and N_2; 78.0 %. The remaining 1.0 % is mostly CO_2 and argon. The total pressure is 101.3 kPa. Find the partial pressures of O_2 and N_2.

7) Assume that 2.50 g of H_2 is combined with 5.20 g of He in a 6.50 L glass container at a temperature of 22°C. Use the ideal gas law to find:

a) the partial pressure of each gas

b) the total pressure

Answers : 1) 130. kPa, 2) 115 atm, 3) P = n (RT/V), since RT/V is a constant, P is proportional to n, 4) 9.0 atm, 5) Ar, 27.0 kPa, He, 54.0 kPa, 6) O_2, 21.3 kPa, N_2, 79.0 kPa, 7)a) H_2, 468 kPa, He, 490. kPa, b) 958 kPa.