

Dalton's Law of Partial Pressure Problems

$$P_T = P_1 + P_2 + P_3 + \dots$$

$$\text{Partial Pressure of a Gas} = \frac{\text{Moles of Gas}}{\text{Total Moles of Gas}} \times \text{Total Pressure}$$

1. A container holds 3 gases, oxygen, carbon dioxide and helium. The partial pressures are 2.00 atm, 3.00 atm and 4.00 atm respectively. What is the total pressure? *(9.00 atm)*
2. A container with 2 gases, helium and argon, is 30.0 % helium by volume. Calculate the pressures of helium and argon if the total pressure inside the container is 425 kPa. *(127.5 kPa)*
3. If 60.0 L of nitrogen is collected over water at 40.0 °C when the atmospheric pressure is 740 mm Hg what is the partial pressure of the nitrogen? *(685 mm Hg)*
4. 80.0 L of oxygen is collected over water at 50.0 °C. The atmospheric pressure is 96.00 kPa. What is the partial pressure of oxygen? *(83.7 kPa (sf!))*
5. A tank contains 480.0 g of oxygen and 80.0 g of helium at a total pressure of 400. kPa.

Calculate the following:

- i) How many moles of oxygen are in the tank? *(15.00 kPa)*
- ii) How many moles of He are in the tank? *(20.0 mol He)*
- iii) Mole fraction of oxygen? *(0.429 or 42.9%)*
- iv) Partial pressure of helium? *(229 kPa)*

Sf!

6. A sample of oxygen gas is saturated with water vapour at 27.0 °C. The total pressure of the mixture is 772 torr and the vapour pressure of water is 26.7 torr at 27.0 °C.

What is the partial pressure of oxygen? *(745 torr)*

7. If 4.0 g of oxygen and 4.0 g of hydrogen are placed in a 5.0 L flask at 65.0 °C, what will be the partial pressure of each gas and the total pressure in the flask? *($P_T = 1200 \text{ kPa}$)*

8. Mixtures of helium and oxygen are used in scuba diving tanks to help prevent the bends. For a particular dive, 46 L of oxygen at 25.0 °C and 101.3 kPa and 12 L of helium at the same conditions were pumped into a 5.0 L tank. *($P_T = 1200 \text{ kPa}$)*

Calculate the partial pressure of each gas and total pressure in the tank at 25.0 °C.

9. At an atmospheric pressure of 2.00 atm and a temperature of 300. K, a chemist collects 1.6 L of hydrogen over water.

How many moles did the chemist collect? *($n = 0.13 \text{ mol}$)*

($P_{O_2} = 950 \text{ kPa}$)
($P_{H_2} = 250 \text{ kPa}$)
↑

($P_{O_2} = 70 \text{ kPa}$)
($P_{H_2} = 1100 \text{ kPa}$)

→ P_{H_2O} ?