CONCEPT: DALTON'S LAW: PARTIAL PRESSURE (SIMPLIFIED)

- **Partial Pressure (P_{Gas})** is the pressure exerted by an individual gas within a mixture.
  - □ In a container of unreacting gases, *total pressure* of the container is the sum of the *partial pressures* of each gas.

Law of Partial Pressures

$$P_{Total} = P_{Gas\_\_} + P_{Gas\_\_} + P_{Gas\_\_} + ...$$

EXAMPLE: A sample of neon gas exerts a pressure of 1.85 atm inside a cylinder. Some nitrogen gas is also present, at a pressure of 500 torr. What is the total pressure inside the cylinder?

Using moles to determine Partial Pressure

- If you assume that the gases behave ideally, then their partial pressures can be calculated from the Ideal Gas Law.

Partial Pressure (Ideal Gas Law)

$$P_{Gas\_\_} = \frac{n\_\_RT}{V}$$

EXAMPLE: If 12.0 g helium and 20.0 g oxygen are placed inside a 5.0 L cylinder at 30 °C, what is the partial pressure of the helium gas?

CONCEPT: DALTON'S LAW: PARTIAL PRESSURE (SIMPLIFIED)

Fractional Composition to Partial Pressure

- When percent composition of a gas is given, first determine its *Fractional Composition*.
  - □ **Fractional Composition (m):** represents the percent composition of a gas divided by total percent.

Fractional Composition

$$\text{Fractional Composition } (m) = \frac{\text{Gas\%}}{100\%}$$

  - □ Calculate the partial pressure of a gas using *its fractional composition (m)* and the total pressure.

Dalton's Law

$$P_{Gas\_\_\_} = m_{Gas\_\_\_} \cdot P_{Total}$$

EXAMPLE: A cylinder of a gas mixture used for calibration of blood gas analyzers in medical laboratories contains 5.0% CO_2, 12.0% O_2, and the remainder N_2 at a total pressure of 146 atm. What is the partial pressure of each component of this gas?

PRACTICE: A gas mixture contains 72.8% chlorine and 27.2% neon by mass. What is the partial pressure of neon in the mixture if the total pressure is recorded as 809 mmHg?

PRACTICE: The partial pressure of N_2 in the air is 593 mmHg at 1 atm. What is the partial pressure of N_2 in a bubble of air a scuba diver breathes when he is 66 ft below the surface of the water where the pressure is 3.00 atm?