6, 7, 8 → Questions for Partial pressures and Solutions.

#6 **Example 1** While kept at a constant temperature, a gas mixture contains the following:

n	gas
0.340	H_2
5.55	He
2.10	Ar

The manometer attached to the container containing the mixture reads 233 kPa. Find the partial pressure of each gas.

$$P_A = \frac{n_A}{n_T} P_T$$

$$P_{H2} = \frac{n_{H2}}{n_T} P_T$$

$$P_{H2} = \left[\frac{0.34}{0.34 + 5.55 + 2.10}\right] 233\ kPa$$

=9.9 kPa

Repeat for other gases; P_{He} = 162 kPa; P_{Ar} = 61 kPa

#7 **Example 2** Since equal volumes of ideal gases contain the same number of moles under the same conditions of P and T, % volumes of gases are directly proportional to mole fractions.

With this in mind, find the partial pressure of oxygen in air at STP.

Air is 21% O_2 by volume.

$n_{O2} = 0.21$

P_T = 101. 3 kPa at STP

$$P_A = \frac{n_A}{n_T} P_T$$

$$P_{O2} = \frac{n_{O2}}{n_T} P_T = \frac{0.21}{1} 101.3 = 21\ kPa$$

Exercises

#8

1. A balloon contains 0.100 moles of oxygen and 0.400 moles of nitrogen. If the balloon is at standard temperature and pressure, what is the partial pressure of the nitrogen?

$$P_{N2} = \frac{n_{N2}}{n_T} P_T = \frac{0.400}{0.100 + 0.400} 101.3 = 81.0\ kPa$$

#9

2. The pressure of a mixture of nitrogen, carbon dioxide, and oxygen is 150.0 kPa. What is the partial pressure of oxygen if the partial pressures of the nitrogen and carbon dioxide are 100.0 kPa and 24.0 kPa, respectively?

$$P_T = P_{N2} + P_{O2} + P_{CO2}$$
$$150.0 = 100.0 + 24.0 + P_{CO2}$$
$$P_{CO2} = 26.0\ kPa$$