1. The three main components of dry air are nitrogen (78.08%), oxygen (20.95%), and argon (0.93%). Calculate the partial pressure (in mmHg) of each gas in a sample of dry air at 760 mmHg. (2 points)

\[
P(\text{N}_2) = 760 \text{ mmHg} \times 0.7808 = 593.4 \text{ mmHg}
\]
\[
P(\text{O}_2) = 760 \text{ mmHg} \times 0.2095 = 159.2 \text{ mmHg}
\]
\[
P(\text{Ar}) = 760 \text{ mmHg} \times 0.0093 = 7.1 \text{ mmHg}
\]

2. If a sample of 4.17 L of ethane gas, C\textsubscript{2}H\textsubscript{6}, at 725 °C is cooled to 175 °C at constant pressure, what is the new volume? (2 points)

\[
\frac{V_1}{T_1} = \frac{V_2}{T_2} \quad \text{4.17 L/998 K} = \frac{V_2}{448 \text{ K}} \rightarrow V_2 = \frac{4.17 \text{ L} \times 448 \text{ K}}{998 \text{ K}} = 1.87 \text{ L}
\]

3. What volume is occupied by 5.8 g of propane gas, C\textsubscript{3}H\textsubscript{8}, at 23 °C and 1.15 atm pressure? (R = 0.0821 L\textit{•}atm/mol\textit{•}K, 4 points)

\[
P \times V = n \times R \times T
\]
\[
V = \frac{n \times R \times T}{P}
\]
\[
n = \frac{5.8 \text{ g C}_3\text{H}_8}{1 \text{ mol C}_3\text{H}_8/44 \text{ g C}_3\text{H}_8} = 0.1318182 \text{ mol}
\]
\[
V = \frac{(0.1318182 \text{ mol} \times (0.0821 \text{ L}\textit{•}atm/mol\textit{•}K) \times 296 \text{ K})}{1.15 \text{ atm}} = 2.8 \text{ L}
\]

4. (1 point, circle one answer only.) Avogadro stated that equal volumes of gases under the same conditions of temperature and pressure have equal:

a. numbers of molecules.
b. numbers of grams.
c. molar masses.
d. atoms.
e. speeds.

5. What are standard temperature and pressure conditions for gases? (1 point, circle one answer only.)

a. 0 °C and 0 torr
b. 0 K and 760 torr
c. –273 °C and 1 atm
d. 0 °C and 760 torr
e. 0 °C and 1 torr