Directions: Show all work. Circle your final answer. No work = no credit.

1. How many torr are equivalent to 7.92 atm?

\[
\frac{7.92 \text{ atm}}{1} \times \frac{760 \text{ torr}}{1 \text{ atm}} = 6020 \text{ torr}
\]

2. Use the Ideal Gas Law to find the temperature of 3.24 mols of a gas in 5600 mL of a gas at 1500. torr. 

\[
T = \frac{PV}{nR} = \frac{(1.97 \text{ atm})(5.0 \text{ L})}{(3.24 \text{ mol})(0.0821)} = \frac{42}{15.5} \text{ K}
\]

3. Given 340. mL of a gas at 80.0°C and 7.92 atm, find the pressure of 542 mL of gas at standard temperature.

\[
\frac{(7.92 \text{ atm})(340 \text{ mL})}{(542 \text{ mL})(358 \text{ K})} = 3.84 \text{ atm}
\]

4. Given 65.0 L of gas at 56°C is cooled to -15°C, find the new volume of the gas.

\[
\frac{(65.0 \text{ L})(258 \text{ K})}{329 \text{ K}} = 51.0 \text{ L}
\]

5. Use the Ideal Gas Law to find the density of helium at standard pressure and 72°C.

\[
D = \frac{\text{mm} \text{ P}}{\text{RT}} = \frac{(2)(1 \text{ atm})}{(0.0821)(845 \text{ K})} = 0.1415 \text{ g/L}
\]

6. Given 6.70 mL a gas with a pressure of 893 torr at 430. K, determine the temperature at 790. torr and 5.00 mL.

\[
\frac{(430 \text{ K})(790 \text{ torr})}{(893 \text{ torr})(5.00 \text{ mL})} = 284 \text{ K}
\]

7. Given a gas with a volume of 36.5 L at 920.0 mm Hg, find the pressure at 23.5 L.

\[
\frac{(920.0 \text{ mm Hg})(36.5 \text{ L})}{(23.5 \text{ L})} = 1430 \text{ mm Hg}
\]
8. Use the Ideal Gas Law to find the volume of 401.30 grams of fluorine gas at 70°C and 920. kPa.

\[ V = \frac{(401.30 \text{ g}) (0.0821) (298 \text{ K})}{(38.09 \text{ g/mol}) (9.08 \text{ atm})} = 32.8 \text{ L} \]

9. Find the molar mass of 350. mL of an unknown gas at standard pressure and room temperature. The mass is found to be 3.56 g.

\[ \text{MM} = \frac{(3.56 \text{ g})(0.0821) (298 \text{ K})}{(1 \text{ atm}) (350 \text{ L})} = 24.9 \text{ g/mol} \]

10. Calculate the effusion rate between ozone gas, O₃, and methane gas, CH₄.

\[ \frac{V_{\text{O}_3}}{V_{\text{CH}_4}} = \sqrt{\frac{\text{MM}_{\text{CH}_4}}{\text{MM}_{\text{O}_3}}} = 7.48 \left( \frac{0.577}{1 \left( \frac{1}{1} \right)} \right) \]

11. An unknown gas diffuses 1.43 times slower than bromine gas, what is its molar mass?

\[ \frac{1}{1.43} = \sqrt{\frac{160}{x}} \]

\[ x = 32.1 \text{ g/mol} \]

12. An open manometer is filled with Hg and connected to a container of hydrogen. The level of Hg is 540 mm higher in the arm connected to the air. Air pressure is 843 kPa. What is the pressure in atm? Draw your manometer.

\[ P_{\text{gas}} = P_{\text{air}} \]

\[ \frac{843 \text{ kPa}}{101.325 \text{ kPa}} = 6323 \text{ mm} + 540 \text{ mm} = 6863 \text{ mm} \]

\[ P = \frac{6863 \text{ mm}}{760} = 9.03 \text{ atm} \]

13. You are vaporized and are now in gaseous form. You have a molar mass of 42.0 g/mol. If you and xenon start at the same point, who will reach the classroom door first? Explain your answer.

\[ T_1 = T_2 \Rightarrow KE_1 = KE_2 \]  (2)

We will reach the door before Xe (3) (lower MM)