1. (4 pts) What are the four main assumptions of kinetic molecular theory as it applies to gases?

1. That they are not
2. That the gas particles with the walls that are rebounding
3. That they are fast
4. That they weight almost nothing

2. (1 pt) What does gas pressure result from?

Pressure results from gas particles hitting and rebounding around the walls of what they hit. Faster they hit faster they hit.

3. (3 pts) Give three units of gas pressure and how to convert between them.

1 atm = 760 mmHg = 101.3 kPa

4. (1 pt) How is the total pressure of a mixture of gases related to the partial pressures of the component gases?

When you add all the partial gases together you get the total gas pressure.

5. (1 pt) Real gases differ most from an ideal gas at low _______ temperatures and _______ pressures.
6. (2 pts) A gas with a volume of 1.20 L at 15°C is heated to 40°C at constant pressure. What will be the volume at the higher temperature?

\[
\frac{1.20}{288} = \frac{V_2}{313} \quad \Rightarrow \quad 275.6 = 288V_2 \quad \Rightarrow \quad V_2 = 1.30 L
\]

7. (2 pts) A gas has a volume of 5.83 L at 2.18 atm. What will its volume be if the pressure is changed to 5.03 atm?

\[
\frac{(2.18)(5.83)}{12.7} = \frac{(5.03)(V_2)}{285} \quad \Rightarrow \quad V_2 = 2.53
\]

8. (2 pts) At 56°C and 868 mm Hg, the volume of a gas sample is 4.30 L. To what must the pressure be adjusted if the volume is to become 6.36 L at 12°C?

\[
\frac{(868)(4.30)}{320} = \frac{(P)(285)}{285} \quad \Rightarrow \quad 1043.24 = 289.44P \quad \Rightarrow \quad P = 508 \text{ mm Hg}
\]

9. (2 pts) If the STP volume of a gas is 6.29 L, what would it be at 1.86 atm and -35°C?

\[
\frac{(1.86)(6.29)}{273} = \frac{(1.86)(V_2)}{288} \quad \Rightarrow \quad 508.78V_2 = 1493.62 \quad \Rightarrow \quad V_2 = 2.95 L
\]

10. (2 pts) A 9.81 L cylinder contains 23.5 moles of nitrogen at 23°C. What pressure, atmospheres, is exerted by the gas?

\[
P = \frac{nRT}{V} = \frac{(23.5)(0.08205)(298)}{9.81} \quad \Rightarrow \quad P = 5890 \text{ kPa}
\]
11. (2 pts) How many moles of nitrogen dioxide are in a 5.24 L cylinder if the pressure is 1.62 atm at 17°C?

\[
\left(1.62 \times 5.24\right) = n \left(0.02100 \times 290\right)
\]

\[
\frac{8.49}{23.8} = 0.357 \text{ mol}
\]

12. (2 pts) At what Celsius temperature will 0.258 mol of argon occupy a volume of 1.00 L and exert a pressure of 6.43 atm?

\[
\begin{align*}
6.43 \times 1.00 & = 0.258 \left(0.08206 \times T\right) \\
6.43 & = 0.258 / T \\
& = 25.2 / T \\
& \Rightarrow T = 38.2°C
\end{align*}
\]

13. (2 pts) Calculate the volume of 1.10 mole of butane, \(C_4H_{10}\), at 0.728 atm and 29°C.

\[
\left(0.778 \times P\right) = \left(1.10 \times 0.08206 \times 302\right)
\]

\[
\frac{0.728 \times P}{1.10} = 29.3
\]

\[
P = 37.4 \text{ L}
\]

14. (2 pts) Determine the total pressure of a gas mixture that contains oxygen, nitrogen, and helium. The partial pressures are: \(P_{O_2} = 25.2 \text{ kPa}\), \(P_{N_2} = 41.3 \text{ kPa}\), and \(P_{He} = 20.6 \text{ kPa}\).

\[
\text{Total gas pressure} = 87.1 \text{ kPa}
\]

15. (2 pts) A gas mixture containing oxygen, nitrogen, and carbon dioxide has a total pressure of 38.1 kPa. If \(P_{O_2} = 4.8 \text{ kPa}\) and \(P_{N_2} = 22.7 \text{ kPa}\), what is \(P_{CO_2}\)?

\[
4.8 + 22.7 + P_{CO_2} = 38.1 \text{ kPa}
\]

\[
P_{CO_2} = 10.6 \text{ kPa}
\]