Gas laws Practice Questions

*Kelvin = °C + 273*

\[ PV = nRT \quad R = 0.0821 \frac{L}{atm \cdot K} \cdot mol \]

\[ \frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2} \]

1. A container of gas at 25 °C and 1 atm is cooled to 0 °C. The volume does not change. What will be the pressure in the container?

2. The container in the previous question has a volume of 95 L. How many moles of air are in the container at 0 °C?

3. A plastic bottle holds 0.025 moles of nitrogen gas at 25 °C and 1 atm pressure. What is the volume of the container?

4. If the container in problem 3 is placed in liquid nitrogen at –196 °C, what will be its volume if the pressure remains at 1 atm?

5. A balloon is filled with 2.75 L of gas measured at 20 °C and 760 mm Hg pressure. This balloon is taken to the top of Squaw Valley ski resort where the balloon shrinks to 2.55 L at 745 mm Hg. What is the new temperature, in °C, of the gas in the balloon?

6. How many moles of gas does the balloon in problem 5 contain when the volume is 2.55 L and the pressure is 745 mm Hg?

7. At what temperature will 5.00 moles of gas occupy a volume of 100 L if the pressure is 1.10 atm?

**CHALLENGE QUESTION** - A 0.0885 g sample of an alkaline earth metal is reacted with hydrochloric acid and the hydrogen gas produced collected in a graduated cylinder inverted in a beaker of water at 20 °C. The level of liquid in the graduated cylinder is equalized to the level outside the cylinder. The atmospheric pressure is 760 mm Hg. The volume of gas collected is 89.6 mL. What is the molar mass of the metal? What is the metal?