

Answer on Question #67932 - Chemistry -General Chemistry

A sample containing 5.6 moles of neon gas at a temp. of 15C and a pressure of 678 mmHg is heated to 77C and a pressure of 888 mmHg. Calculate the change in volume that occurs.

Solution:

Ideal gas law:

$$P_1 \times V_1 = n_1 \times R \times T_1$$

$$P_1 = 678 \text{ mmHg} \approx 90392.6 \text{ Pa}$$

$$T_1 = 15 + 273.15 = 288.15 \text{ K}$$

$$V_1 = \frac{n_1 \times R \times T_1}{P_1} = \frac{5.6 \times 8.314 \times 288.15}{90392.6} = 0.148 \text{ m}^3$$

$$T_2 = 77 + 273.15 = 350.15 \text{ K}$$

$$\frac{P_1 \times V_1}{T_1} = \frac{P_2 \times V_2}{T_2}$$

$$V_2 = \frac{P_1 \times V_1 \times T_2}{T_1 \times P_2} = \frac{678 \times 0.148 \times 350.15}{288.15 \times 888} = 0.137 \text{ m}^3$$

$$\Delta V = 0.148 - 0.137 = 0.011 \text{ m}^3 = 11 \text{ L.}$$

Answer:

11 L.