

5. A gas with a volume of 2.5 L at a pressure of 260 kPa expands to a volume of 5.5L. What is the pressure of the container if the temperature remains constant?

Solution

To answer this question we should use the equation of combined gas law:

$$P_1V_1/T_1 = P_2V_2/T_2;$$

If the temperature remains constant the law can be written as:

$$P_1V_1 = P_2V_2, T_1 = T_2 = \text{const};$$

$$V_1 = 2.5 \text{ L} = 2.5 \text{ dm}^3 = 2.5 \cdot 10^{-3} \text{ m}^3;$$

$$P_1 = 260 \text{ kPa} = 260 \cdot 10^3 \text{ Pa};$$

$$V_2 = 5.5 \text{ L} = 5.5 \text{ dm}^3 = 5.5 \cdot 10^{-3} \text{ m}^3;$$

$$260 \cdot 10^3 \cdot 2.5 \cdot 10^{-3} = P_2 \cdot 5.5 \cdot 10^{-3};$$

$$P_2 = 118182 \text{ Pa} = 118 \text{ kPa}.$$

Answer: 118 kPa