

A balloon with a volume of 5.58 L is at a pressure of 0.86 atm and a temperature of 12°C. If the pressure is increased to 4.2 atm and the temperature is raised to 48°C, what is the new volume of the balloon?

$$V_1 = 5.58 \text{ L} = 0.00558 \text{ m}^3$$

$$T_1 = 12^\circ\text{C} = 275 \text{ K}$$

$$P_1 = 0.86 \text{ atm} = 87139.5 \text{ Pa}$$

$$T_2 = 48^\circ\text{C} = 321 \text{ K}$$

$$P_2 = 4.2 \text{ atm} = 425565 \text{ Pa}$$

$$V_2 = ?$$

$$P_1V_1 = nRT_1$$

$$P_2V_2 = nRT_2$$

$$P_1V_1/P_2V_2 = nRT_1/nRT_2$$

$$P_1V_1T_2 = P_2V_2T_1$$

$$V_2 = P_1V_1T_2/P_2T_1$$

$$V_2 = (87139.5 \text{ Pa} * 0.00558 \text{ m}^3 * 321 \text{ K}) / (425565 \text{ Pa} * 275 \text{ K}) = 0.00133 \text{ m}^3$$

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