

Task:

An 8.00 L sample of neon gas at a temperature of 23 °C exerts a pressure of 7.2 atm. If the gas is compressed to 2.00 L and the temperature is raised to 225 °C, what will the new pressure be?

Solution:

The combined gas law describes the relationship of the pressure, temperature, and volume of an enclosed gas

According to the Combined gas Law, if the amount of gas is constant

$$P_1 \cdot V_1 / T_1 = P_2 \cdot V_2 / T_2$$

P_1 – the initial pressure (atm)

V_1 – the initial volume (L)

T_1 – the initial temperature (°C)

P_2 – the new pressure (atm)

V_2 – the new volume (L)

T_2 – the new temperature (°C)

The new pressure is

$$P_2 = P_1 \cdot V_1 \cdot T_2 / T_1 \cdot V_2$$

$$P_2 = 7.2 \cdot 8.00 \cdot 225 / 23 \cdot 2.00 = 282 \text{ atm}$$

Answer: $P_2 = 282 \text{ atm}$