

A sample of helium gas has a volume of 325 ml at 0.44 atm. What pressure is needed to reduce the volume of gas at constant temperature to 75 ml?

Solution: Assuming that helium behaves as an ideal gas, at constant temperature it can be described by Boyle's law: $P_1 \cdot V_1 = P_2 \cdot V_2$. Then, pressure P_2 which corresponds to the volume V_2 can be calculated as:

$$P_2 = \frac{P_1 \cdot V_1}{V_2} = \frac{0.44 \cdot 325}{75} = 1.907 \text{ atm} = 1.907 \cdot 101.3 \text{ kPa} = 193.2 \text{ kPa}.$$

Answer: 1.907 atm or 193.2 kPa.