Name Cronin Class Key Date

Practice Exercises

Exercise 1: At a given temperature, gas with a pressure of 150 kPa has a volume of 0.8 L. If the pressure decreases to 75 kPa and the temperature remains the same, what will be the volume of the gas?

Boyle's Law

Given: $P_1 = 150\,kPa$ $V = 0.8\,L$ $P_2 = 75\,kPa$ $T_1 = T_2$ $V_2 = ?$

$P_1 V_1 = P_2 V_2$

$(150\,kPa)(0.8\,L) = (75\,kPa)(V_2)$ $\boxed{V_2 = 1.6\,L}$

Exercise 2: A liter of gas has a pressure of 200 kPa. If the gas is put into 2-L container, what will be its pressure, assuming its temperature does not change?

Boyle's Law

Given: $P_1 = 200\,kPa$ $P_2 = ?$

$V_1 = 1\,L$ $V_2 = 2\,L$

$P_1 V_1 = P_2 V_2$

$(200\,kPa)(1\,L) = P_2(2\,L)$

$\boxed{100\,kPa = P_2}$

Exercise 3: A given volume of gas at a temperature of 100 K has a pressure of 225 kPa. At a higher temperature, the same volume of gas has a pressure of 450 kPa. At what temperature does the gas have this higher pressure?

Combined Gas Law

Given: $T_1 = 100\,K$ $T_2 = ?$

$P_1 = 225\,kPa$ $P_2 = 450\,kPa$

$V_1 = V_2$

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

$\frac{(225\,kPa)(V_1)}{100K} = \frac{(450\,kPa)(V_2)}{T_2}$

$\boxed{T_2 = 200\,K}$

Exercise 4: Gas under 200 kPa of pressure at a temperature of 120 K fills a 0.5-L container. If the temperature decreases to 80 K but the pressure stays the same, what volume will the gas have?

Charles' Law

$P_1 = 200\,kPa$ $P_2 = 200\,kPa$

$T_1 = 120\,K$ $T_2 = 80\,K$

$V_1 = 0.5\,L$ $V_2 = ?$

$\frac{V_1}{T_1} = \frac{V_2}{T_2}$ $\frac{0.5\,L}{120K} = \frac{V_2}{80K}$

$\boxed{V_2 = 0.3\,L}$

Exercise 5: A volume of 1.5 L liters of a gas at a temperature of 150 K has a pressure of 340 kPa. If the temperature of the gas increases to 200 K and the volume decreases to 1 L, what is the new pressure of the gas?

$V_1 = 1.5\,L$ $V_2 = 1\,L$

$T_1 = 150\,K$ $T_2 = 200\,K$

$P_1 = 340\,kPa$ $P_2 = ?$

$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$ $\frac{(340\,kPa)(1.5L)}{150K} = \frac{(P_2)(1L)}{200K}$

$3.4 = \frac{P_2}{200K}$ $\boxed{P = 680\,kPa}$