Suppose you had a 3.25-L sample of neon gas at 21°C and a pressure of 0.954 atm. What would be the volume of this gas if the pressure were increased to 1.270 atm while the temperature remained constant?

Solution:

To find volume of neon gas if the pressure were increased to 1.270 atm while the temperature remained constant we should use the equation of combined gas law:

$P_1V_1/T_1 = P_2V_2/T_2$;

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

$P_1V_1 = P_2V_2, T_1 = T_2$ = const;

$V_1 = 3.25\ L = 3.25\ dm^3 = 3.25 \cdot 10^{-3}\ m^3$;

$P_1 = 0.954\ atm = 0.954 \cdot 101325\ Pa = 96664.05\ Pa$;

$P_2 = 1.270\ atm = 1.270 \cdot 101325\ Pa = 128682.75\ Pa$;

$96664.05 \cdot 3.25 \cdot 10^{-3} = 128682 \cdot V_2$;

$V_2 = 2.44 \cdot 10^{-3}\ m^3 = 2.44\ dm^3 = 2.44\ L$.

Answer: 2.44 L