Question 10

When 2 gm of a gas A is introduced into an evaluated flask kept at 25°C, the pressure is found to be one atmosphere. If 3 gm of another gas B is then added to the same flask, the total pressure becomes 1.5 atm. Assuming ideal gas behaviour, calculate the ratio of the molecular weights $M_A : M_B$. ***(1983 - 2 Marks)***

From ideal gas equation,

$$PV = nRT \Rightarrow PV = \left(\frac{m}{M}\right) RT \text{ or } M = m\frac{RT}{PV}$$

Let the molecular wt. of A and B be M_A and M_B respectively.

$$\text{Then } M_A = 2\frac{RT}{1 \times V};\ M_B = \frac{3 \times RT}{0.5 \times V}$$

$$\therefore \frac{M_A}{M_B} = \frac{2RT}{V} \times \frac{0.5V}{3RT} = \frac{2 \times 0.5}{3} = \frac{1}{3}$$

Therefore, the ratio $M_A : M_B = \mathbf{1 : 3}$