

Previous JEE question 2

A 2.5 L flask contains 0.25 mol each of sulphur dioxide and nitrogen gas at 27°C. Calculate the partial pressure exerted by each gas and also the total pressure.

Answer:

Partial pressure of sulphur dioxide.

$$P_{\text{SO}_2} = nRT/V$$

$$= 0.25 \text{ mol} \times 8.314 \text{ J mol}^{-1} \text{ K}^{-1} \times 300 \text{ K} / 2.5 \times 10^{-3} \text{ m}^3$$

$$= 2.49 \times 10^5 \text{ N m}^{-2} = 2.49 \times 10^5 \text{ Pa}$$

Similarly, $P_{\text{N}_2} = 2.49 \times 10^5 \text{ Pa}$

Following Dalton's law, we get

$$P_{\text{Total}} = P_{\text{N}_2} + P_{\text{SO}_2}$$

$$= 2.49 \times 10^5 \text{ Pa} + 2.49 \times 10^5 \text{ Pa}$$

$$= 4.98 \times 10^5 \text{ Pa}$$