

The average translational kinetic energy of N_2 gas molecules at $^{\circ}C$ becomes equal to the K.E. of an electron accelerated from rest through a potential difference of 0.1 volt. (Given $k_B = 1.38 \times 10^{-23} \text{ J/K}$) (Fill the nearest integer). (JEE MAIN 2021)

By ideal gas equation; $PV = nRT$

Case 1:- $P_1 V_1 = nR(250) \leftarrow \textcircled{1}$

Case 2:- As 25% of molecules get dissociated then, $n \rightarrow n + \frac{n}{4} \Rightarrow n \rightarrow \frac{5n}{4}$

$\therefore P_2(2V_1) = \left(\frac{5n}{4}\right) R(2000) \leftarrow \textcircled{2}$

Dividing $\textcircled{1}$ by $\textcircled{2}$

$\therefore \frac{P_1}{2P_2} = \frac{4 \times 250}{5 \times 2000}$

$\Rightarrow \frac{P_1}{P_2} = \frac{1}{5}$

$\Rightarrow \boxed{\frac{P_2}{P_1} = 5}$