∴ Number of Collision per second $= \frac{C_x}{2l}$ —— (2)

∴ Change in momentum along x direction wall per second due to $\frac{C_x}{2l}$ Collisions $= 2mC_x \times \frac{C_x}{2l} = \frac{mC_x^2}{l}$ —— (3)

∴ Change in momentum per second due to the collision of one gas molecule on two opposite faces along x axis $= \frac{mC_x^2}{l} + \frac{mC_x^2}{l} = \frac{2mC_x^2}{l}$

Therefore the rate of change in momentum due to the collision per molecule on six faces of the cube $= \frac{2mC_x^2}{l} + \frac{2mC_y^2}{l} + \frac{2mC_z^2}{l}$

$$= \frac{2m}{l}(C_x^2 + C_y^2 + C_z^2)$$

$$= \frac{2mC^2}{l}$$

Therefore the rate of change in momentum for n molecules $= \frac{2mnC^2}{l}$ —— (4)

According to Newton's 2nd law, the rate of change of momentum is equal to force

And we also know that force per unit area is the Pressure of a gas

Hence, force $= \frac{2mnC^2}{l}$

and area $= 6l^2$

∴ Pressure $= \frac{\text{Force}}{\text{Area}} = \frac{2mnC^2}{l \times 6l^2}$

$$= \frac{\cancel{2}mnC^2}{3\cancel{6}l^3} \quad [\because l^3 = V]$$

∴ Pressure $P = \frac{1}{3}\frac{mnC^2}{l^3} = \frac{1}{3}\frac{mnC^2}{V}$ —— (5)

or $P = \frac{1}{3}\frac{MC^2}{V}$ $[\because mn = M]$

or $PV = \frac{1}{3}MC^2$ —— (6)

The above equation is called the Kinetic gas equation.