We define $\mu = \dfrac{\bar{m}}{m_H}$

average mass of gas particle in units of mass of H atom

1.674×10^{-27} kg

so that $P = \dfrac{\rho k T}{\mu m_H}$

The temperature of the gas is a measure of the **average kinetic energy** of the gas particles

Suppose all particles have mass, m

$$\frac{1}{2} m \overline{v^2} = \frac{3}{2} kT$$

- $\overline{v^2}$ = "Mean square" velocity
- Factor of 3 comes from 3 directions (x, y, z) of gas motion (= 3 degrees of freedom)
- $T = 0\,K$ Absolute zero ; all gas motions cease

$$P = \frac{1}{3} \rho \overline{v^2}$$