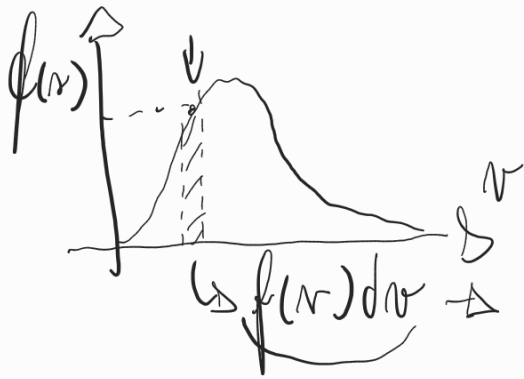


$f(v)$ é a densidade de probabilidade.



Fração das moléculas com vel. entre v e $v+dv$

→ Multiplicar por $v \Rightarrow$ velocidade média $\rightarrow v f(v) dv$

→ Para todo espaço, integramos

$$\bar{c} = \int_0^{\infty} v f(v) dv = \int_0^{\infty} v \left[4\pi \left(\frac{m}{2\pi RT} \right)^{3/2} v^2 e^{-mv^2/2RT} \right] dv$$

$$\bar{c} = 4\pi \left(\frac{m}{2\pi RT} \right)^{3/2} \int_0^{\infty} v^3 e^{-mv^2/2RT} dv$$

→ Integral tabelada $\int_0^{\infty} x^3 e^{-ax^2} = \frac{1}{2a^2}$

$$\bar{c} = 4\pi \left(\frac{m}{2\pi RT} \right)^{3/2} \cdot \frac{1}{2 \left(\frac{m}{2RT} \right)^2} = 4 \cdot 2\pi \cdot m^{3/2} \cdot \frac{1}{2} \cdot (2\pi)^{-3/2} \cdot (RT)^{1/2}$$

$$\bar{c} = 8\pi \cdot m^{-1/2} \cdot (2\pi)^{-3/2} \cdot (RT)^{1/2} = 4(2\pi)^{3/2} (2\pi)^{-3/2} \cdot m^{-1/2} \cdot (RT)^{1/2}$$

$$\bar{c} = 4(2\pi)^{-1/2} \left(\frac{RT}{m} \right)^{1/2} = 4 \left(\frac{RT}{2\pi m} \right)^{1/2} = \left(\frac{16RT}{2\pi m} \right)^{1/2}$$

$$\bar{c} = \left(\frac{8RT}{\pi m} \right)^{1/2}$$

$$\bar{c} = \left(\frac{8RT}{\pi M} \right)^{1/2} \quad \text{p / N}_2 \quad \text{a } 25^\circ\text{C}$$

$$\bar{c} = \left(\frac{8 \cdot 8,3141 \frac{\text{J}}{\text{mol} \cdot \text{K}} \cdot 298 \text{K}}{\pi \cdot (28,02 \cdot 10^{-3} \frac{\text{kg}}{\text{mol}})} \right)^{1/2} = \left(22165,8252 \frac{\text{m}^2}{\text{s}^2} \right)^{1/2}$$

$$\bar{c} = 474,52 \text{ m/s}$$