

Assignment - 1
B.Sc. Physics (H) Sec. (A)

Q₁ = 1 Assuming that low energy neutrons are in thermal equilibrium with the surrounding without absorption and that the Maxwellian distribution for velocities is valid, deduce their energy distribution.



Q₂

If we have Maxwell's distribution for velocities of molecules is given by

$$N(v) dv = 2\pi N \left(\frac{m}{2\pi kT}\right)^{3/2} v^2 \exp\left(-\frac{mv^2}{2kT}\right) dv$$

(i) Show that the probability distribution of molecular velocities in terms of the most probable velocity between α and $\alpha+d\alpha$ is given by

$$N(\alpha) d\alpha = \frac{4N}{\sqrt{\pi}} \alpha^2 e^{-\alpha^2} d\alpha$$

$$\text{where } \alpha = \frac{v}{v_p} \text{ and } v_p = \left(\frac{2kT}{m}\right)^{1/2}$$

(ii) Calculate the value of $\langle \frac{1}{v} \rangle$.