

### Answer on Question #61171-Physics-Molecular Physics | Thermodynamics

Calculate the coefficient of viscosity of hydrogen at STP. Take

$r = 8.90 \times 10^{-2} \text{ kg m}^{-3}$ ,  $l = 2 \times 10^{-7} \text{ m}$  and  $\lambda = 1.38 \times 10^{-23} \text{ JK}^{-1}$ .

**Solution**

$$\eta = \frac{1}{3} \rho v \lambda$$

$$v = \sqrt{\frac{3kT}{m}}$$

At stp  $T = 273 \text{ K}$  and volume  $22.4 \cdot 10^{-3} \text{ m}^3$ .

$$m = \frac{\rho V}{N_a} = \frac{8.90 \cdot 10^{-2} \cdot 22.4 \cdot 10^{-3}}{6.02 \cdot 10^{23}} = 3.31 \cdot 10^{-27} \text{ kg}$$

$$v = \sqrt{\frac{3 \cdot 1.38 \cdot 10^{-23} \cdot 273}{3.31 \cdot 10^{-27}}} = 1848 \frac{\text{m}}{\text{s}}$$

$$\eta = \frac{1}{3} \cdot 8.90 \cdot 10^{-2} \cdot 1848 \cdot 2 \cdot 10^{-7} = 1.09 \cdot 10^{-5} \frac{\text{kg}}{\text{ms}}$$