

No. :

Date. :

Persamaan gas Ideal

$$PV = nRT \quad \text{dengan} \quad k = \frac{R}{N_0} = 1,38 \cdot 10^{-23} \text{ J/mole} \cdot K$$

$$\text{dimana } PV = \frac{1}{3} N m \bar{v}^2$$

$$\text{Energi dalam gas Ideal } E = \frac{3}{2} kT$$

Jika molekul tadi bergerak dengan kecepatan rata-rata ($\bar{v}^2$)
maka $E = \frac{1}{2} m \bar{v}^2$

Contoh soal :

Jika ada sebuah molekul O_2 dengan massa $5,31 \times 10^{-25} \text{ kg}$.
Hitung kecepatan rata-rata kuadrat molekul tersebut jika
molekul O_2 tersebut ~~berap~~ berada pada suhu 300 K!

Jawab :

$$\text{diketahui } m = 5,31 \times 10^{-25} \text{ kg}$$

$$T = 300 \text{ K}$$

$$k = 1,38 \times 10^{-23} \text{ J/mole} \cdot K$$

ditanya E ?

Jawab :

$$E = \frac{3}{2} k \cdot T$$

$$= \frac{3}{2} \cdot 1,38 \times 10^{-23} \text{ J/mole} = \frac{150}{300} \text{ K}$$

$$= 6,21 \times 10^{-21} \text{ J/mole}$$

$$E = \frac{1}{2} m \bar{v}^2$$

$$6,21 \times 10^{-21} = \frac{1}{2} \cdot 5,31 \times 10^{-25} \text{ kg} \times \bar{v}^2$$

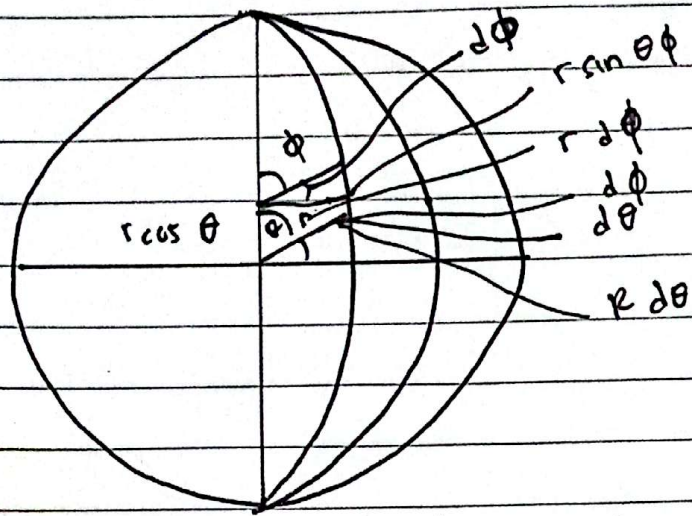
$$\bar{v}^2 = \frac{6,21 \times 10^{-21}}{5,31 \times 10^{-25}} \times 2$$

$$5,35 \times 10^{-25}$$

KIKY

No. :

Date. :



$$\begin{aligned}
 dA &= r \times r \\
 &= r d\theta \cdot r \sin \theta d\phi \\
 &= r^2 \sin \theta d\theta d\phi
 \end{aligned}$$

$$\begin{aligned}
 dV &= r \times r \times dr \\
 &= r^2 \sin \theta dr d\theta d\phi
 \end{aligned}$$

$$V = \int_0^R \int_0^\pi \int_0^{2\pi} r^2 \sin \theta d\phi d\theta dr = \frac{4}{3} \pi R^3$$

$$\begin{aligned}
 &= 2\pi \int_0^R \int_0^\pi r^2 \sin \theta d\theta dr = 2\pi \frac{1}{3} R^3 \int_0^\pi \sin \theta d\theta \\
 &= \frac{2\pi}{3} R^3 \left[-\cos \theta \right]_0^\pi
 \end{aligned}$$

KIKY