

65. 立方体内の気体分子の運動と断熱膨張

補足

$$\begin{aligned}\Delta U &= -\frac{Nm\overline{v^2}wt}{3L} \\ &= -\frac{1}{2}Nm\overline{v^2} \cdot \frac{2L^2wt}{3L^3} \\ &= -\frac{3}{2} \cdot \frac{N}{N_A} RT \cdot \frac{2}{3} \cdot \frac{\Delta V}{V} \quad \dots \textcircled{1}\end{aligned}$$

$$U = \frac{3}{2} \cdot \frac{N}{N_A} RT \text{ より, } \Delta U = \frac{3}{2} \cdot \frac{N}{N_A} R\Delta T \quad \dots \textcircled{2}$$

$$\textcircled{1}, \textcircled{2} \text{ より, } -\frac{3}{2} \cdot \frac{N}{N_A} RT \cdot \frac{2}{3} \cdot \frac{\Delta V}{V} = \frac{3}{2} \cdot \frac{N}{N_A} R\Delta T \quad \therefore \Delta T = -\frac{2}{3} \cdot \frac{\Delta V}{V} \cdot T$$