$U_{rot} = F_{rot} + TS_{rot} = NkT$! 2 degrees of freedom

Total energy $U = U_{trans} + U_{rot} = \frac{5}{2} NkT$

in general when molecule are not symmetric, I_1, I_2, I_3

$$\rightarrow U_{rot} = \frac{3}{2} NkT$$

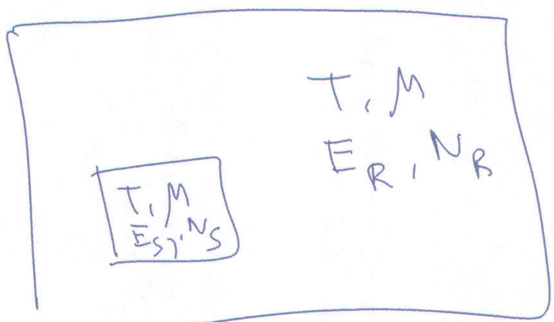
$$U = U_{rot} + U_{trans} = 3NkT$$

Gran canonical ensemble.

describes open system : exchange energy & particles with surrounding :

microcanonical	(E, V, N)	T is deduced
canonical	(T, V, N)	E is deduced
grand canonical	(T, V, μ)	E, N is deduced

consider



whole $\Omega(E, N)$

a microstate of the system with energy E_S, N_S.

$$P = \frac{\Omega_R(E_R, N_R)}{\Omega(E, N)} \propto \Omega_R(E - E_S, N - N_S)$$

expand $$k \ln \Omega_R = k \ln \Omega_R(E, N) - \frac{\partial}{\partial E}(k \ln \Omega) \cdot E_S - \frac{\partial}{\partial N}(k \ln \Omega) N_S$$