

Draw an energy level diagram for a vibrating particle as a function of the zero point energy. Do the same for rotational motion. Be sure to specify the spacing in each of the diagrams.

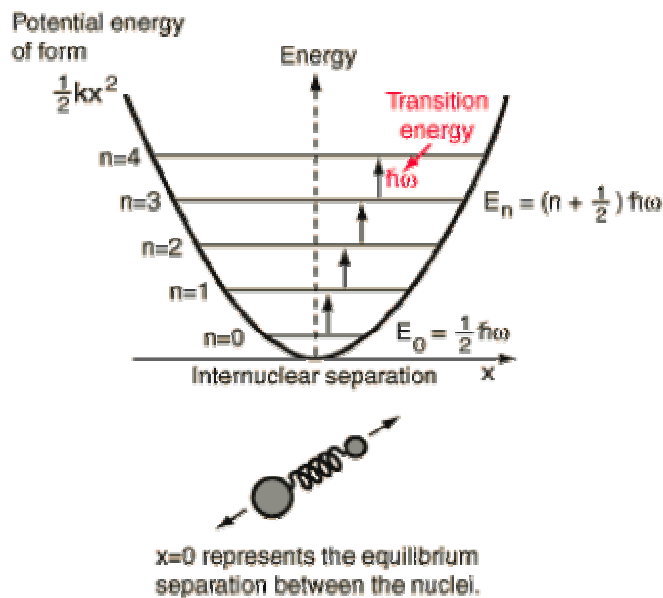
Sol) The vibrational energy as at zero point level = $E_0 = \frac{1}{2} \hbar \omega$

For n^{th} vibrational state, the energy level is $E_n = (\frac{1}{2} + n)\hbar \omega$

Here ω = angular vibrational frequency

$\hbar = h/2\pi$

The Energy level diagram for a vibrating particle is as follows



Here Y-axis is vibrational (potential) energy axis and X-axis is distance from the equilibrium position.

The rotational levels lie within Vibrational Energy levels as follows

