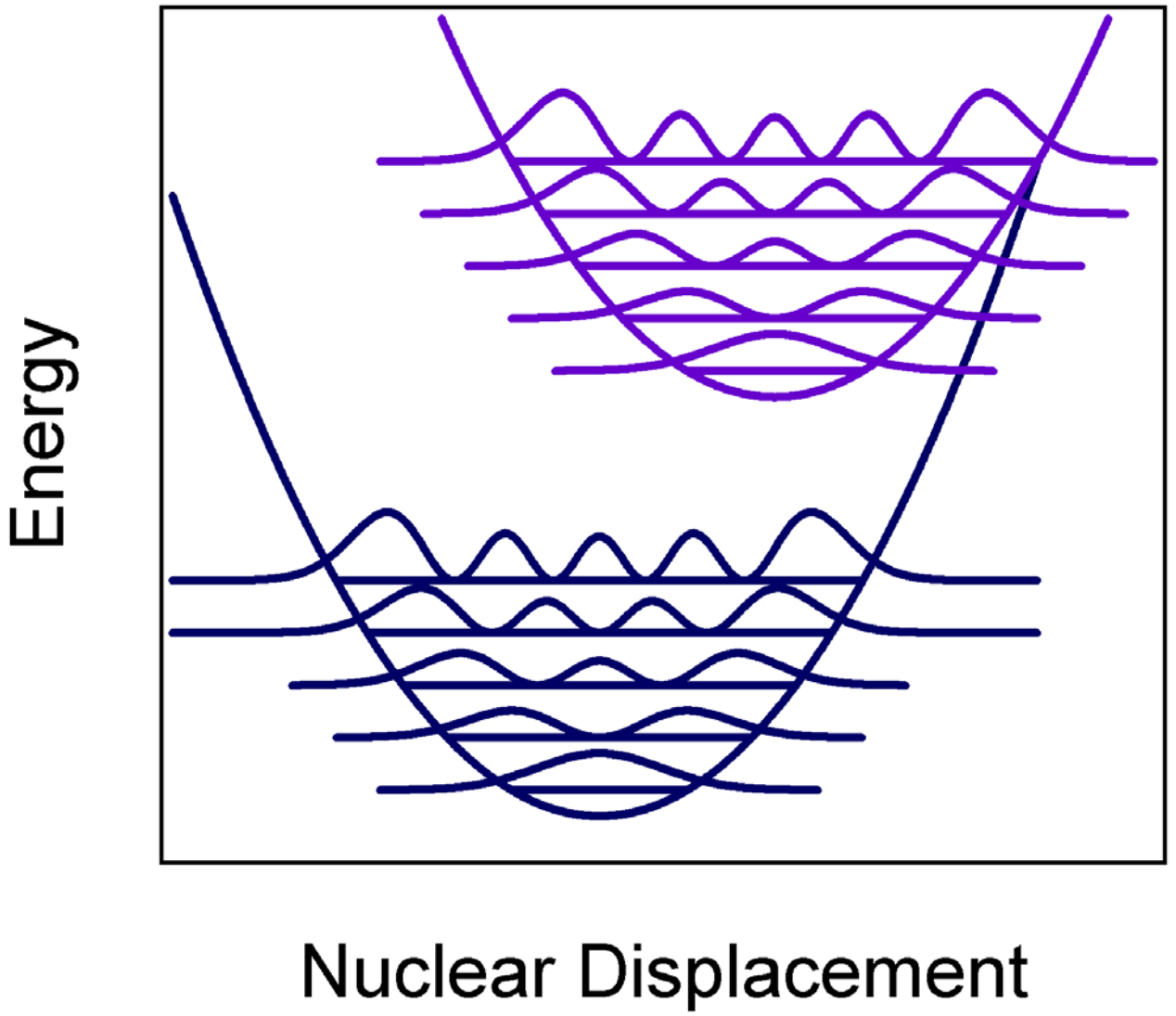
Franck-Condon factor



Franck-Condon factor

We can use a T = 0 K approximation to calculate the Franck-Condon factor. In this approximation the molecules are in their electronic and vibrational ground state. Therefore, the FC transitions are from 0 -> 0', 0 -> 1', 0 -> 2', etc. The formula for this approximation is given by:

$$FC = \sum_{n=0'}^{\infty} \frac{S^n e^{-S}}{n!} \delta(\omega - \omega_{0-0'} - n\omega_{vib})$$

Calculate the "stick spectrum" by making a table showing the relative magnitude of the first 5 vibrational lines above 0-0'. You are given the follow information.

$$\omega_{0-0'} = 21{,}000\ cm^{-1}$$
$$\omega_{vib} = 1600\ cm^{-1}$$
$$S = 1.5$$