WELCOME

FRANCK-CONDON PRINCIPLE- INTENSITY OF VIBRATIONAL ELECTRONIC SPECTRA

In a molecule the individual atoms vibrate about a mean position and therefore the internuclear distance changes continuously.

According to franck-condon principle an electronic transition takes place so rapidly that a vibrating molecule does not change its internuclear distance appreciably during the transition.

During an electronic transition the internuclear distance remains the same.

We have already seen the origin of the vibrational electronic transitions (0,0) (1,0) (2,0)....

The intensity distribution of the lines in electronic spectra of molecules is not same.

The an harmonic model of a diatomic molecule has a potential energy curve represented by the "Morse function"

The morse function curve along with probability densities |Ψ| with internuclear distance for the lowerst five energy states.

for v=0, the atom is most likely to be found at the centre of its motion. For v=1,2,3,.....
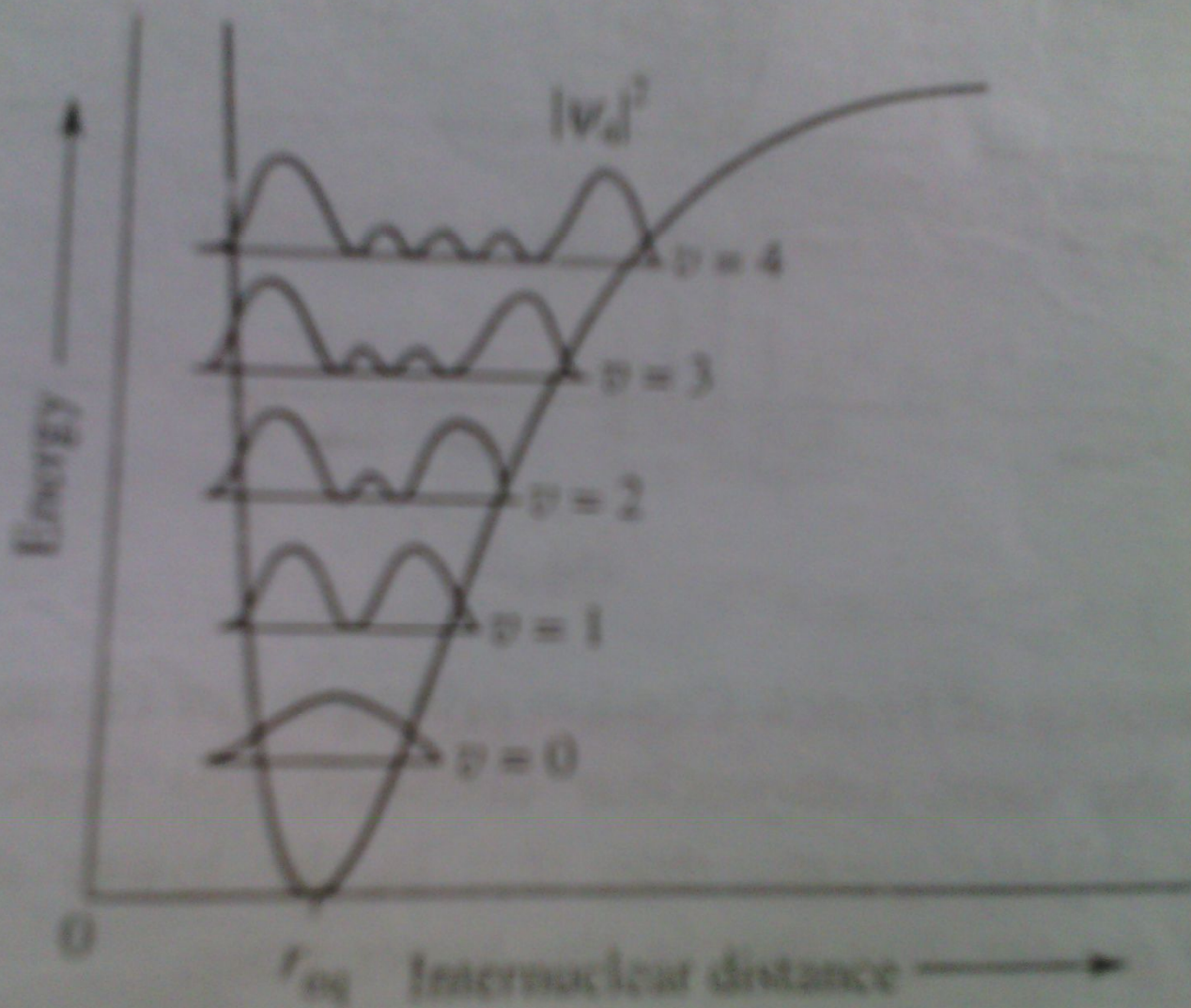
The bond length of the lower and upper electronic states are assumed to be equal.

If the molecule is initially in the v=0 of the lower electronic state the probability of the finding the atom is greatest at the equillibrium distance.

The vertical from the maximum of v"=0 meats the maximum of v'=0, the most intense line will be the (0,0) transition.

In the same way the (3,0) transition will be the most intense one. Vertical from the maximum of v"=0.

FRANCK-CONDON principle is thus able to account for the intensties of lines in vibrational-electronic spectra.

(a)   (b)   (c)