



“Degree Of Freedom”

Fundamental vibration of molecule depend on degree of freedom

Each atom has 3 degree of freedom depend on x, y, z

For a molecule containing n number of atom s has 3n degree of freedom

For non linear molecule 3 degree of freedom represent rotational & transational motion

For non linear (3n-6)degree of freedom represent fundamental vibrations

For linear (3n-5)degree of freedom represent fundamental vibrations



All vibrational changes don't appear as band



Only those vibrational changes that result in change in dipole moment appear as band

HOOKE'S LAW

- It gives the relation between frequency of oscillation , atomic mass , force constant of the bond .
- Thus vibrational frequency is

$$= \frac{1}{2} \pi c \sqrt{f/(M_x M_y)/(M_x + M_y)}$$

- C = velocity of light
- F = force constant
- M_x = mass of atom x
- M_y = mass of atom y

- Since force constant measures the strength of bond, value of f is

FOR SINGLE BOND

• 5×10^5 dynes/cm

FOR DOUBLE BOND

• 10×10^5 dynes/cm

FOR TRIPLE BOND

• 15×10^5 dynes/cm

Factors On Which Vibrational Frequency Depends:

