

* Difference betⁿ Raman & IR Spectra

Raman Spectra

1. It is observed due to scattering of light by vibrating molecules.

2. Polarizability of the molecule will ^{decide} whether the Raman Spectra will be observed or not.

3. Water can be used as a solvent.

4. Optical ^{systems} of the Spectrometer are made up of glass or quartz.

IR Spectra

1. It is result of absorption of light by vibrating molecules.

2. The presence of a permanent Dipole change moment may be change ^{is} regarded as Criteria of IR Spectra.

3. Water cannot be used because it is opaque to IR radiation.

4. Optical ^{systems} of the Spectrometer are made up of special crystals. Such as CaF_2 , NaBr etc.



5. In Raman effect
vibrational frequencies
of large molecules
can be measured.

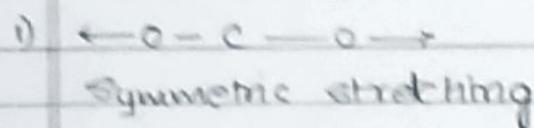
6. The vibrational
frequencies of
very large molecule
cannot be measured.

6. Homonuclear diatomic
molecules are Raman
active. i.e. N_2 , O_2 etc
show Raman spectra.

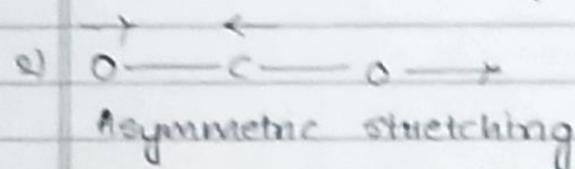
6. Homonuclear
diatomic molecules
are IR inactive.
i.e. N_2 , O_2 do not show
IR-spectra.

+ vibrational modes of CO_2

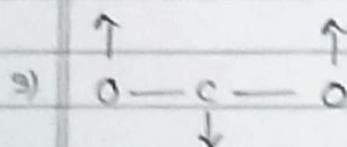
$$\begin{aligned} \therefore \text{No. of modes of vibration} &= 3n - 5 \\ &= 3 \times 3 - 5 \\ &= 4 \end{aligned}$$



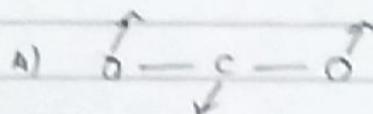
Raman active but IR inactive



Raman inactive but
IR active



Bending in plane



Bending out of plane

Degenerate IR active