

## Spectroscopy -

Electromagnetic spectrum (EM)

$$c = \lambda \cdot \nu - \text{frequency (Hz} \equiv \frac{1}{s} \text{ or } s^{-1})$$

speed of light  $\rightarrow$   $c$

wavelength (m)  $\rightarrow$   $\lambda$

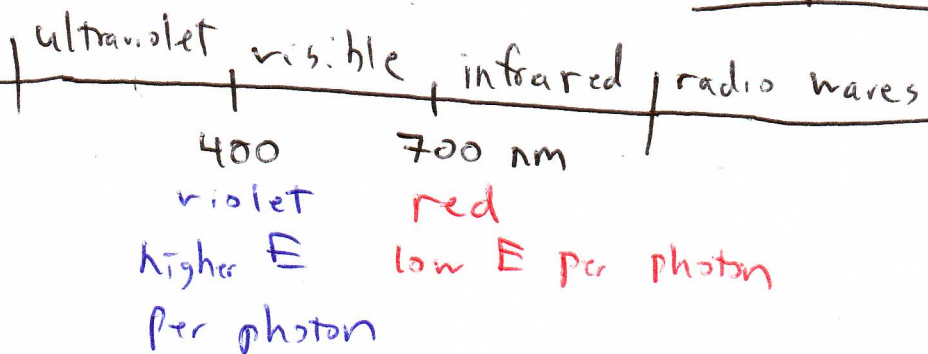
$$E = h\nu$$

energy per photon (particle)  $\rightarrow$   $E$

Planck's constant  $\rightarrow$   $h$

frequency (wave)  $\rightarrow$   $\nu$

$E \uparrow$   $\Delta E = h\nu$  In order for this energy gap to be crossed, light with the correct frequency - and therefore the correct energy per photon - must be used.



UV-Vis - ultraviolet / visible

- electronic energy levels → electronic structure  
transitions between

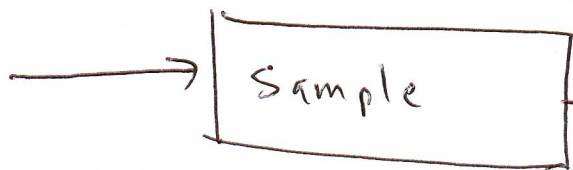
#2

IR - infrared

- vibrational transitions → bond types  
functional groups

NMR - Nuclear magnetic resonance

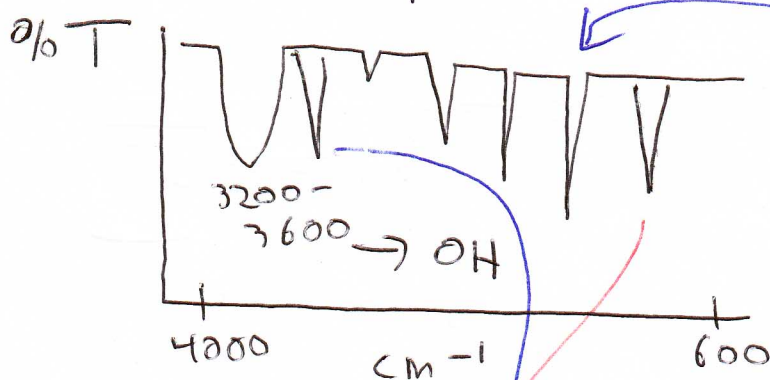
- radio waves → used to determine full chemical structure



light source

% transmittance - the % of light that successfully passes through a sample.

absorbance - the fraction of light absorbed by the sample.



peak  
each peak corresponds to particular mode of bond vibration

2850-2970 - alkyl groups  
600-800 → C-C