$n \rightarrow \pi^*$ → Forbidden transition taken place at a higher wavelength → S

$>C=O$

$n \rightarrow \sigma^*$ transition not allowed ∴ called Forbidden transition

based on Symmetric consideration
n and π are on different planes.

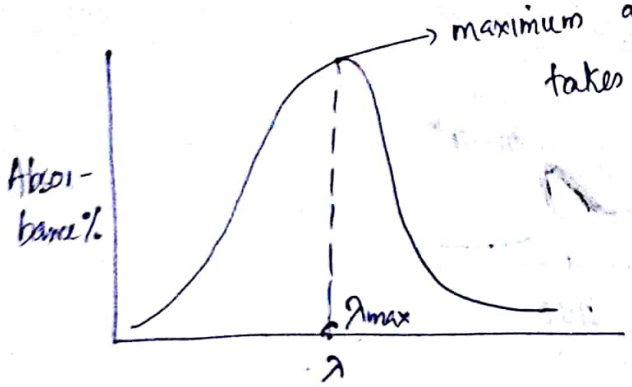
↑ → ↓ UV - Visible spectrophotometer to see the UV-visible transition happening in a molecule.

Instrumentation

UV- Visible spectrophotometer consists of :-

→ light source
→ ~~Ch~~ monochromator : filter the light and gives ~~in~~ out light of single wavelength
→ Reference compartment
→ Sample compartment
→ Detector

→ Signal processor



190 nm onwards all the spectrometers are timed

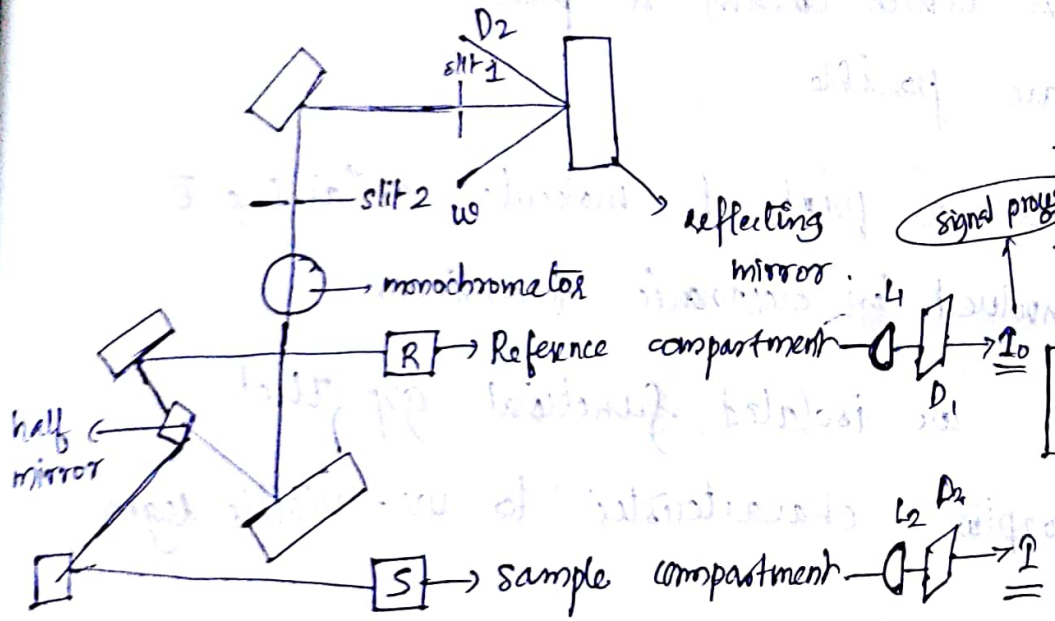
UV and visible cannot get from a single source

→ Deuterium lamp will provide light in UV region

→ Tungsten filament lab provide light in visible region

→ a beam of light combination (UV-visible in each compartment) double beam

In present day UV-visible spectrophotometer



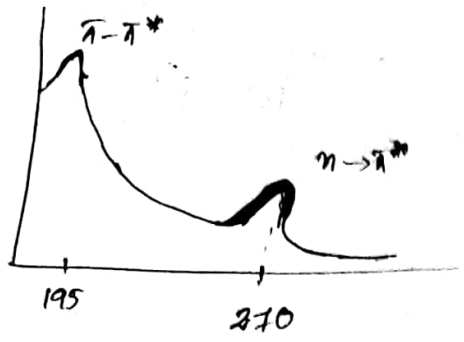
Sample soln → solvent + sample

reference soln → solvent only

Condn for selecting solvent

1. sample should not react with the solvent
2. " must be completely dissolved
3. " solution made of sample must be completely soluble so that it is transparent

U-V spectrum of acetone



Chromophores

→ Those substances which contain a part in which electronic transitions are possible

→ Chromophores is a part of molecule containing $\bar{e}$ which are involved in electronic transitions.

→ are isolated functional grp that exhibits absorption characteristic to UV - visible region

eg:- C=O, C=C, C≡C

In C_6H_5OH, —OH will not absorb in UV-visible region if it is present in chromophores then it will absorb in UV-visible region. Those groups are called

Auxochromes.

Auxochromes does not show ~~not~~ absorbtion in UV-visible region alone. ~~but shows~~ But when present

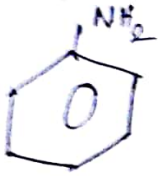
with a chromophore, then it will shifts its absorption either to higher or lower wavelength

eg: OH, NH_2 -OR

λ_{max}

255 nm.

shifts to higher wavelength Battochromes & Red shift

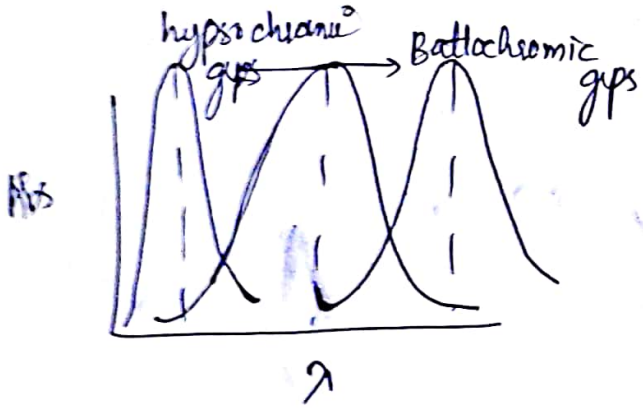


280 nm

shifted to a lower wavelengths, such gps are called Hypsochromic gps or blue shifts

254 nm

shift happens

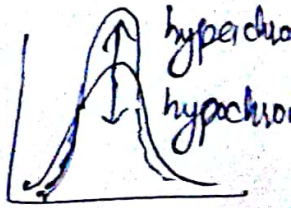


~~If the shift~~

C_6H_5OH — 6900 cm^{-1}

C_6H_5ONa — 9900 cm^{-1}

ϵ_{max} → for measuring absorption of intensity



Hyperchromic gp which ↑ses the rate of absorption

Hypochromic gp " ↓ses " " "

	ϵ_{max}
C_6H_5COOH	$11600\ cm^{-1}$
$C_6H_5COOH + NaOH$	
~~$C_6H_5COOH + N$~~ ~~C_6H_5COONa~~	$8700\ cm$.

Applications of UV-visible spectrophotometer