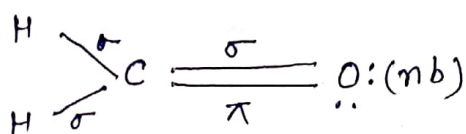
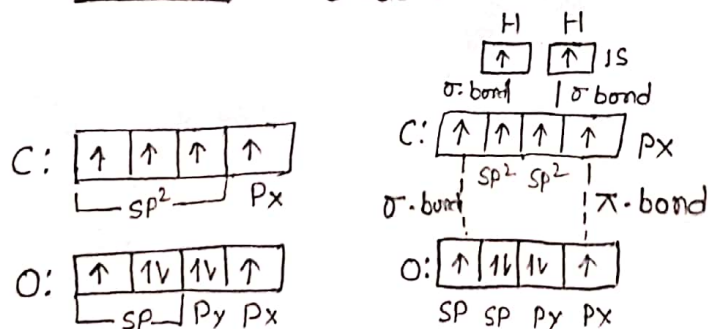
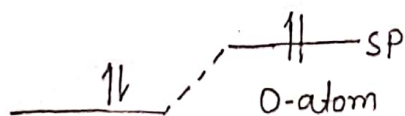
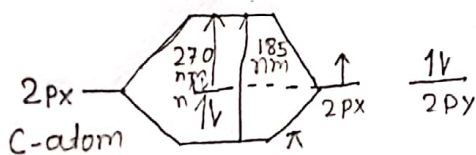


Q Discuss the UV spectra of formaldehyde.

Ans In formaldehyde (HCHO) each C-H bond arises by the linear overlap of  $sp^2$  orbital of Carbon and  $1s$  orbital of H-atoms. Hence C-H bonds are  $\sigma$ -bonds. A  $\sigma$ -bond between C & O atoms arises by the linear overlap of  $sp^2$  orbital of Carbon and  $sp$  orbital of O-atoms and a  $\pi$ -bond by the lateral overlap of  $2p_x$  and  $2p_x$  orbitals -



Transition	Energy	Wavelength in nm
$1 n \rightarrow \pi^*$	Low	High 270
$2 \pi \rightarrow \pi^*$	High	Low 185



The O-atom has two lone pairs of electrons - one in  $2p_y$  orbital and another in  $sp$  orbital. The lone pair present in  $p_y$  orbital can co-ordinate due to greater  $p$ -character because the dumb bell  $p$ -orbital is more extended in space than the spherical  $s$ -orbital.

$P_y - 100\%$

P-Character

SP - 50%

P-Character

from the molecular orbital diagram, it is clear that HCHO shows two transitions in UV-vis spectra  
 $\pi \rightarrow \pi^*$  at 185 nm and  $n \rightarrow \pi^*$  at 270 nm. The latter has lower intensity than the former due to forbidden nature.