EXAMS ROAD

"Bringing Excellence to Students"

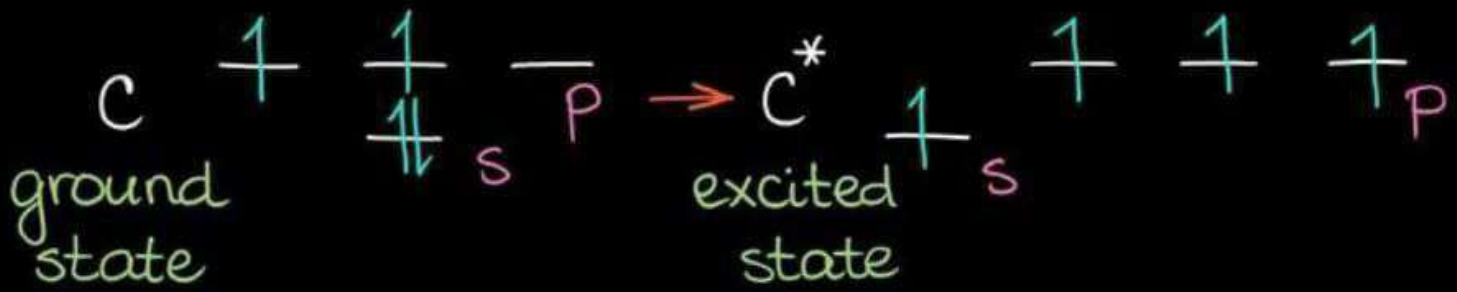
Handwritten Notes

On

Hybridization

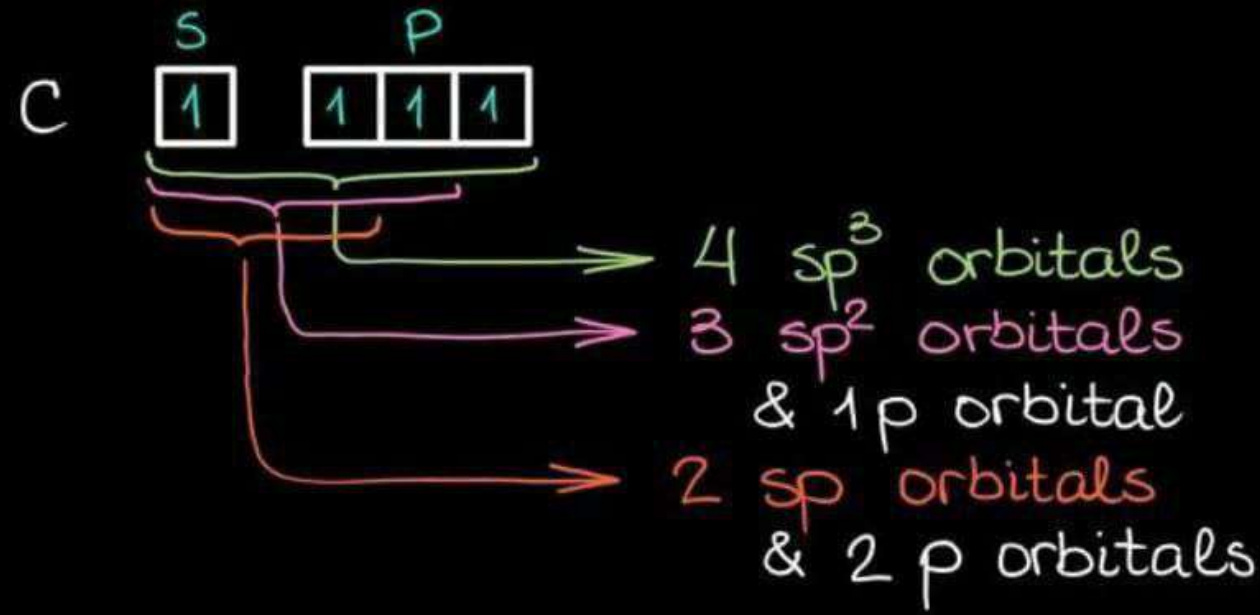
Hybridization

Hybridization is a mathematical model that helps us to explain the bonding in organic molecules.



Hybridization is "mixing" of the orbitals resulting in "averaging" of the orbitals & giving the "hybrids".

Important: # of AO = # of MO



How do we determine the hybridization?

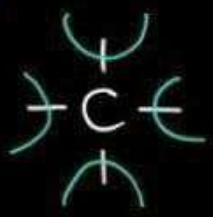
The quick way of determining hybridization is to count the groups around the atom:

# of groups → hybridization

4 = sp^3

3 = sp^2

2 = sp

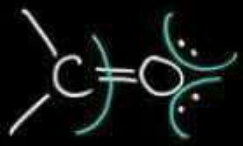


4 groups => sp^3

3 groups => sp^2

We count $\bar{e}$ pairs as "group" for the hybridization purposes:

4 "groups" => sp^3



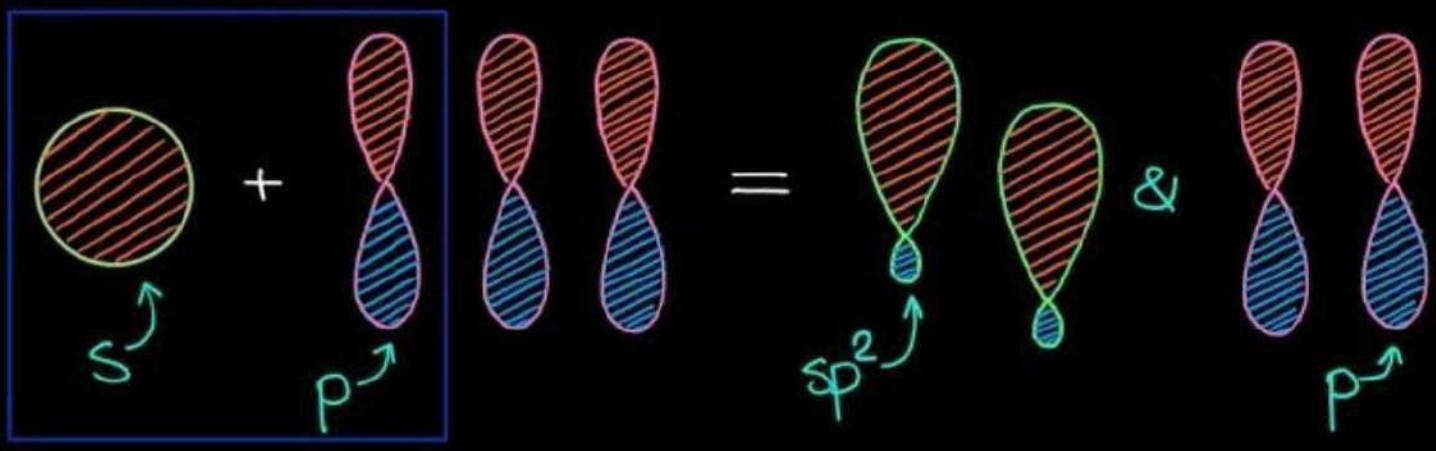
3 "groups" on Oxygen => sp^2

2 "groups" on Nitrogen => sp

When an electron pair is next to a π-bond, the $\bar{e}$ pair is going to resonancely conjugate with the π bond. The resonance requires the $\bar{e}$'s to be on the p orbital shifting the hybridization to a lower value.

sp-Hybridization

- mixing one s & one p orbitals gives two sp orbitals & leaves two p orbitals unused.

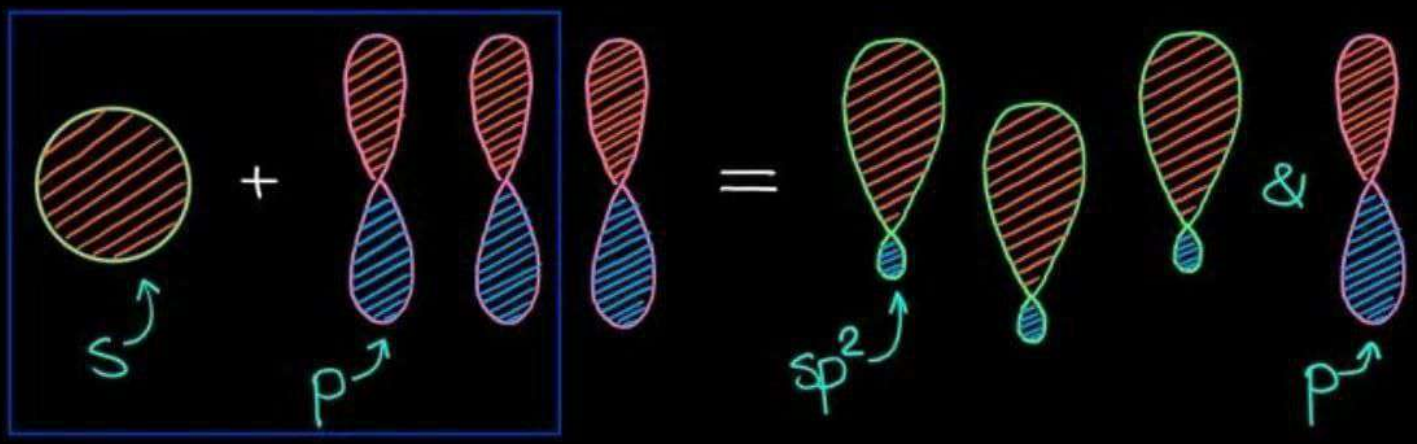


sp-hybridized orbitals form a linear shape

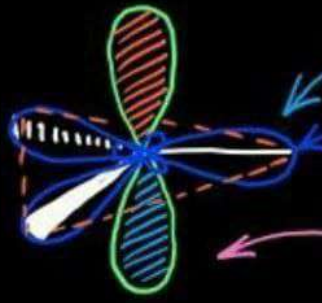
Bond angles= 180°

sp^2 - Hybridization

- mixing one s & two p orbitals gives three sp^2 orbitals & one unused p orbital still remains.

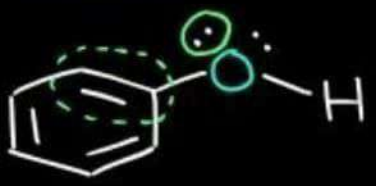


sp^2 - hybridized orbitals form a trigonal planar shape

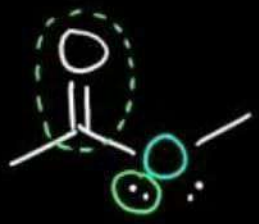


Bond angles = 120°

Examples:

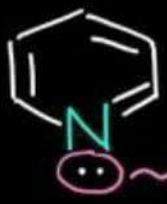


looks like sp^3
actual sp^2



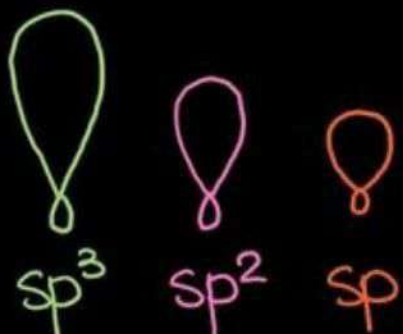
looks like sp^3
actual sp^2

BUT



~ these $\bar{e}$'s are localized
=> are not a part of resonance => still sp^2

The difference blw the sp^3, sp^2, & sp orbitals:



Orbital length
(not to scale)

$sp^3 > sp^2 > sp$

↑ longest

← shortest