ARJUNA

JEE 2026 BATCH

Inorganic Chemistry

Chemical Bonding

Lecture No- 9

By – OM PANDEY, IIT Delhi

Topics *to be covered*

1. Hybridisation (part-2)

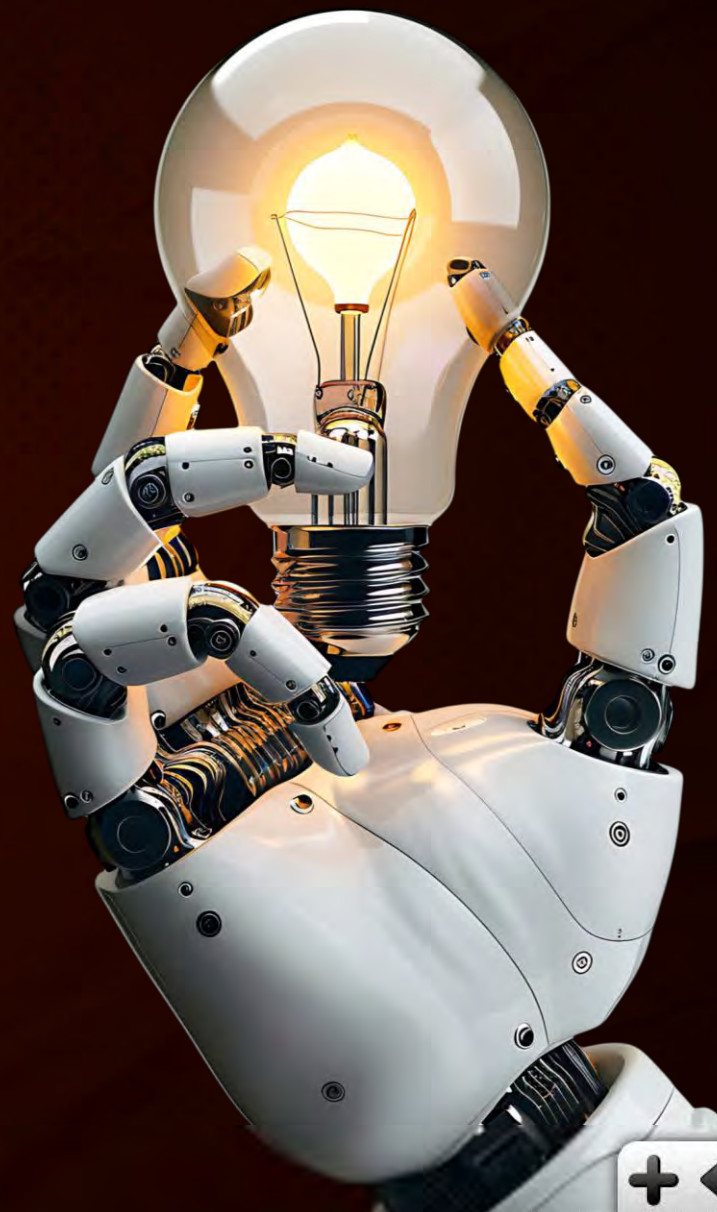
[NEET PYQ's → 20 Questions]

"30 min"

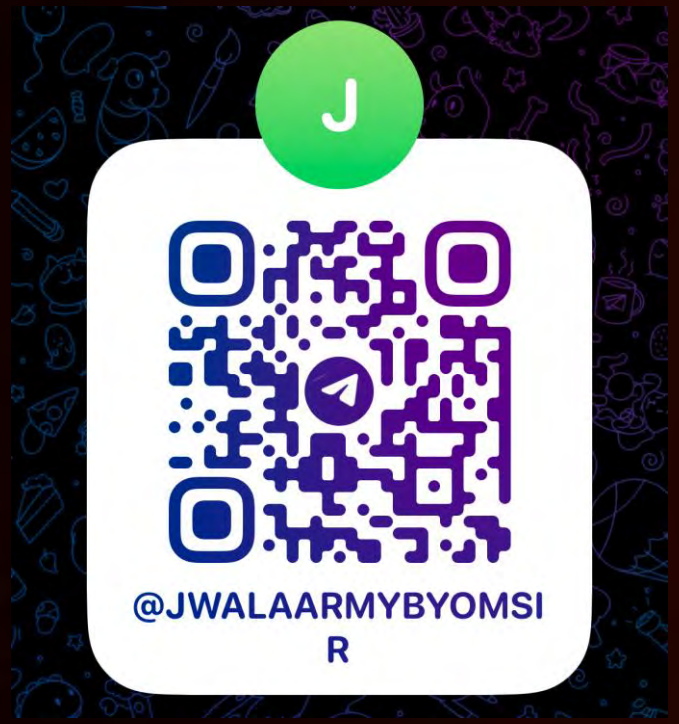
JEE Mains → NTA

JEE Advanced → IIT's

- History of PT → Super Sunday (1 hr)



Talk with OP^2 Baba



sp Hybridisation

Cl : 3s (↑↓) 3p (↑↓) (↑) (↑)

$BeCl_2$

Cl —σ— Be —σ— Cl

SN = LP + SA

= 0 + 2 = 2

Hyb^n → sp (Linear)

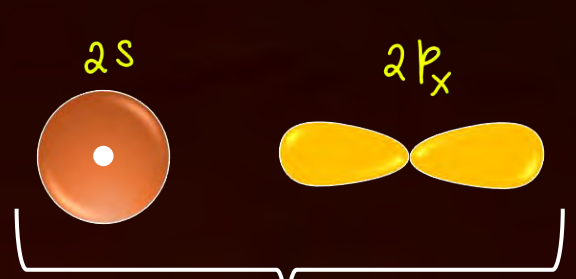
Be$_{es}$ → 2s (1) 2p ($2p_x$ 1, $2p_y$, $2p_z$)

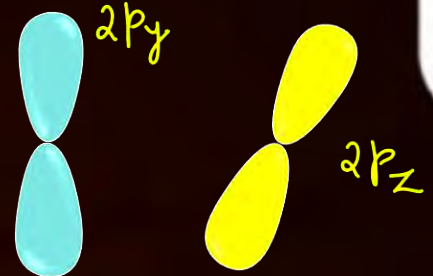
2s 2p

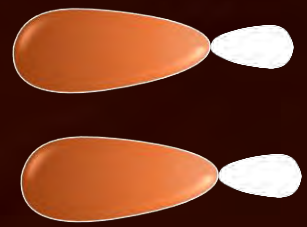
(1) (1) → 2, sp hybrid orbitals

(1) (1) (L) $(3p)_{Cl}$ — σ — (L) (1) (1) $(3p)_{Cl}$

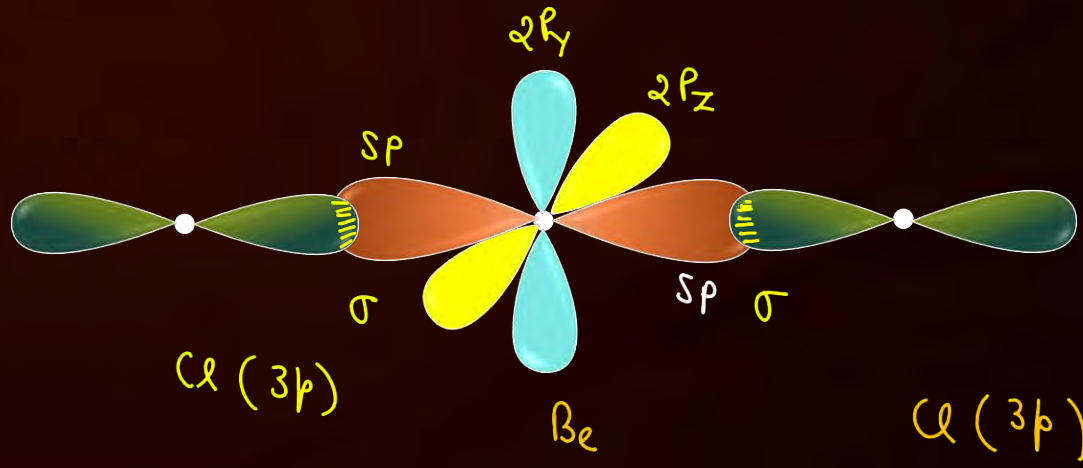
2, Be–Cl bonds → $(sp)_{Be} - (3p)_{Cl}$







→ 2, sp hybrid orbitals



CO_2

$O_2 \overset{\pi_2}{=} C \overset{\pi_1}{=} O_1$

π bond → 2nd period elements — 2s ✗, 2p ✓ [B, C, N, O]

SN = LP + SA
= 0 + 2
= 2
→ sp hybridisation

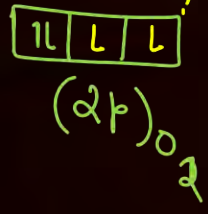
$[xy]\,\pi_1 : (2p_y)_C - (2p_y)_{O_1}$

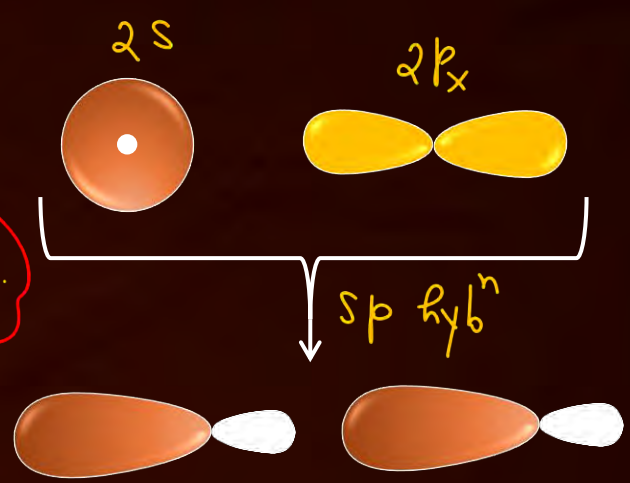
$[xz]\,\pi_2 : (2p_z)_C - (2p_z)_{O_2}$

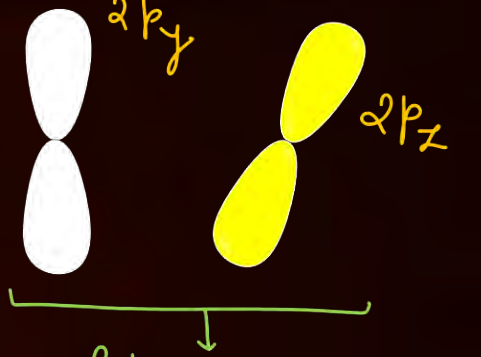
plane of π_1 is ⊥r to the plane of π_2

C_{es} → 2s | 2p_x 2p_y 2p_z

2 . sp hybrid orbitals



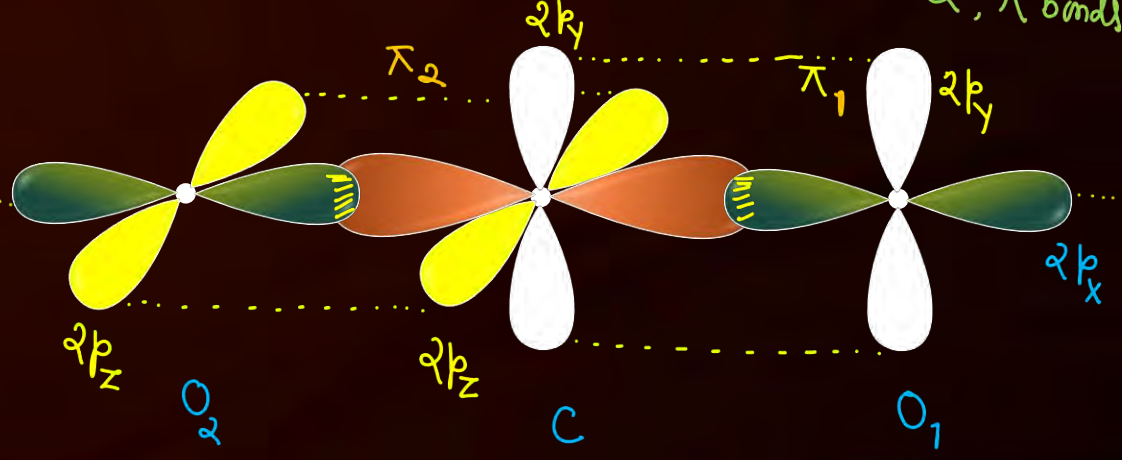




2 . sp hybrid orbitals → 2σ bonds

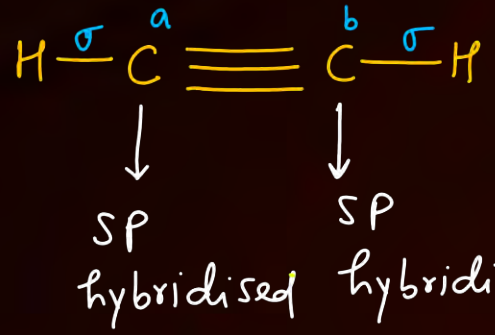
⇓

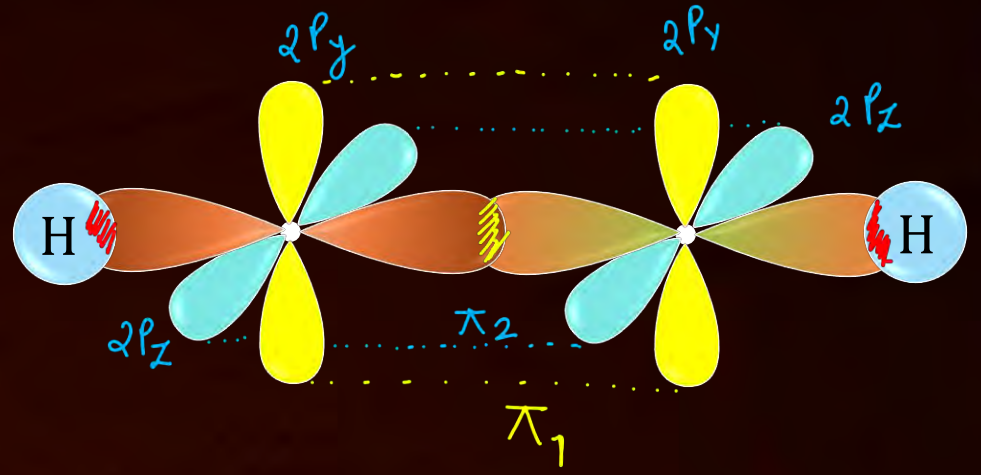
2 . π bonds



- 2 C–O σ bonds : $(sp)_C - (2p)_O$
- 2 C–O π bonds : $(2p)_C - (2p)_O$

C_2H_2

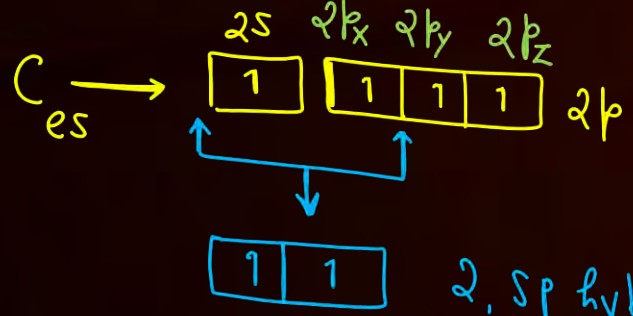




- 2 C–H σ bonds ⟶ $(sp)_C - (1s)_H$
- 1 C–C σ bonds ⟶ $(sp)_C - (sp)_C$
- 2 C–C π bonds ⟶ $(2p)_C - (2p)_C$

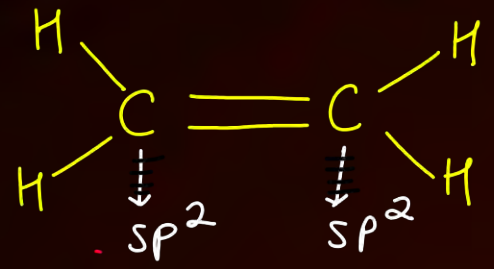
C_a C_b

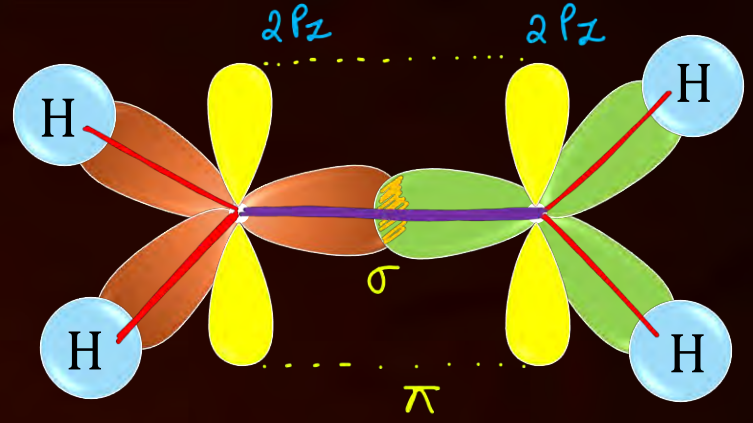
plane of $\pi_1 \perp^r$ plane of π_2.



2, sp hybrid orbitals

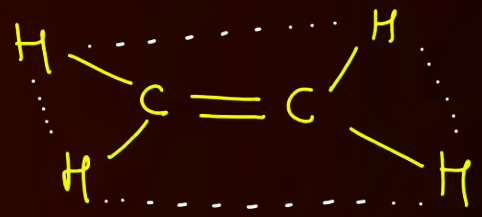
C_2H_4

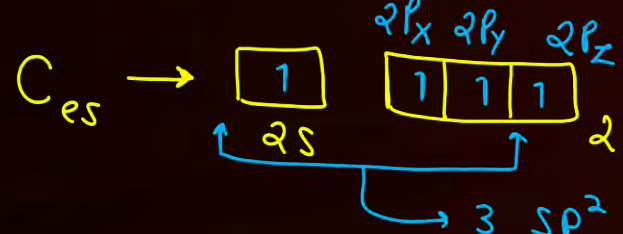




- 4 C–H σ bonds : $(sp^2)_C - (1s)_H$
- C–C σ bond : $(sp^2)_C - (sp^2)_C$
- C–C π bond : $(2p)_C - (2p)_C$

- Molecular Plane → 6 atoms

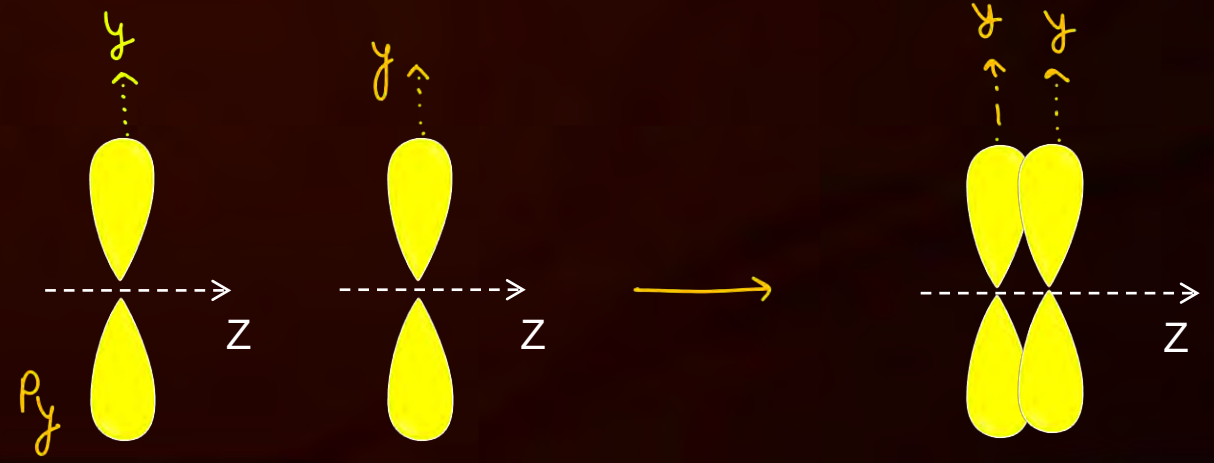




→ 3, sp^2 hybrid orbitals.

Nodal Plane of π-bond : xz plane

Nodal plane of p_y → xz plane



QUESTION [JEE 2002]

The nodal plane in the π-bond of ethene is located in

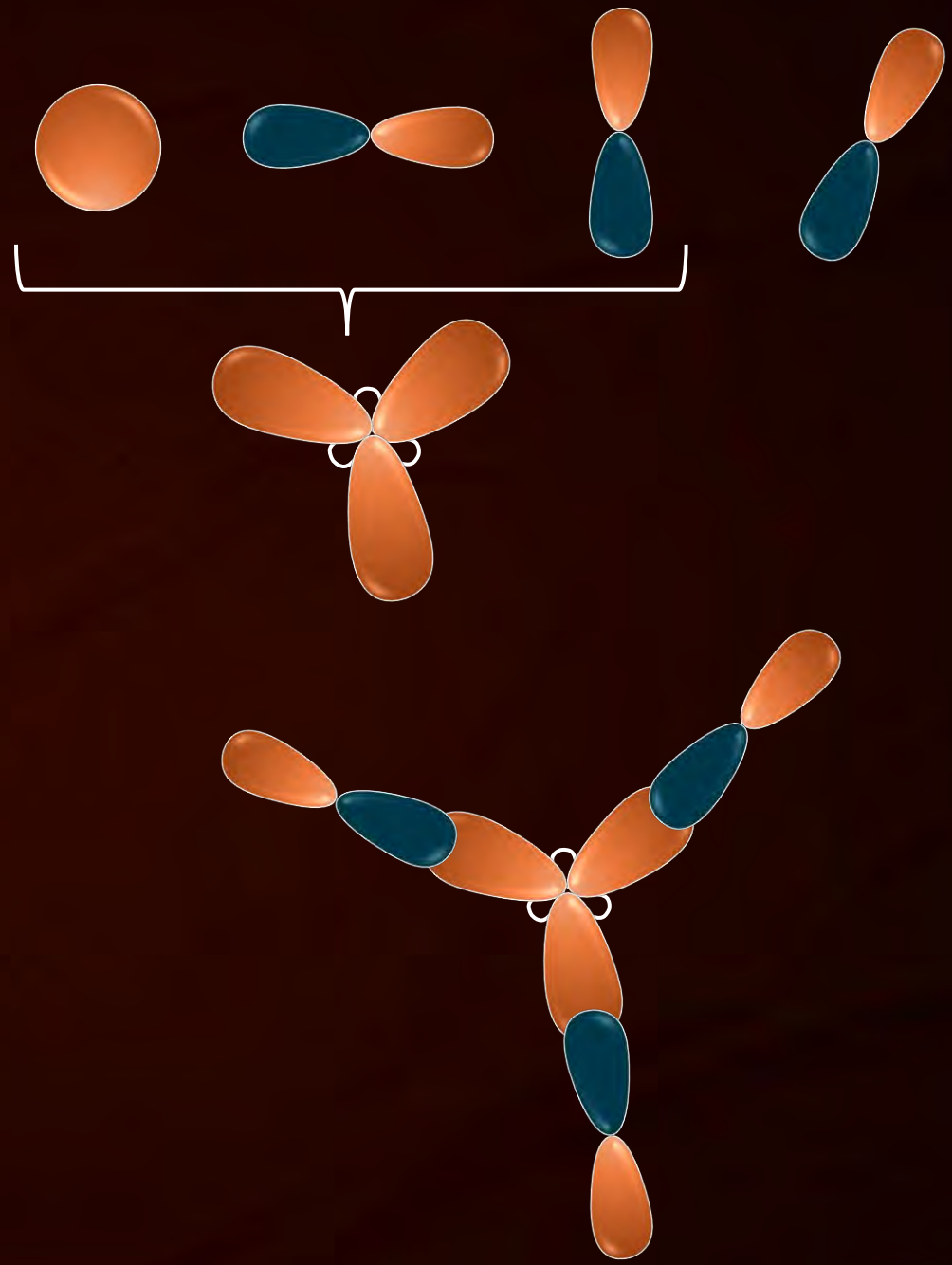
A the molecular plane

B a plane parallel to the molecular plane

C a plane perpendicular to the molecular plane which bisects the carbon-carbon σ-bond at right angle

D a plane perpendicular to the molecular plane which contains the carbon-carbon σ-bond

BF_3



Home work

Periodic Table PYQ's on page 147 : 1 to 52

THANK You